5-6115-465-12

ARMY TECHNICAL MANUAL TM5-6115-465-12
NAVY PUBLICATION NAVFAC P-8-625-12
AIR FORCE TECHNICAL ORDER TO-35C2-3-446-1
MARINE CORPS TECHNICAL MANUAL TM-06858B/06859D-12

TECHNICAL MANUAL

OPERATOR AND ORGANIZATIONAL MAINTENANCE MANUAL

GENERATOR SET, DIESEL ENGINE DRIVEN, TACTICAL SKID MTD. 30 KW, 3 PHASE, 4 WIRE, 120/208 AND 240/416 VOLTS

DOD MODEL	CLASS	HERTZ	FSN
MEP-005A	UTILITY	50/60	6115-118-1240
MEP-104A	PRECISE	50/60	6115-118-1247
MEP-114A	PRECISE	400	6115-118-1248

INCLUDING AUXILIARY EQUIPMENT

DOD MODEL	NOMENCLATURE	FSN
MEP-005AWE	WINTERIZATION KIT, FUEL BURNING	6115-463-9083
MEP-005AWE	WINTERIZATION KIT, ELECTRIC	6115-463-9085
MEP-005ALM	LOAD BANK KIT	6115-463-9088
MEP-005AWM	WHEEL MOUNTING KIT	6115-463-9094

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JANUARY 1975

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C 12

CHANGE
NO 12

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HEADQUARTERS, U.S. MARINE CORPS
WASHINGTON, D.C., 11 April 88

Operator and Organizational Maintenance Manual

GENERATOR SET, DIESEL ENGINE DRIVEN, TACTICAL SKID MTD, 30 KW, 3PHASE, 4 WIRE, 120/208 AND 240/416 VOLTS

DOD MODEL	CLASS	HERTZ	NSN
MEP-005A	UTILITY	50/60	6115-00-118-1240
MEP-104A	PRECISE	50/60	6115-00-118-1247
MEP-114A	PRECISE	400	6115-00-118-1248

INCLUDING AUXILLIARY EQUIPMENT

DOD MODEL	NOMENCLATURE	NSN
MEP-005AWF	WINTERIZATION KIT, FUEL BURNING	6115-00-463-9083
MEP-005AWE	WINTERIZATION KIT, ELECTRIC	6115-00-463-9085
MEP-005ALM	LOAD BANK KIT	6115-00-463-9088
MEP-005AWM	WHEEL MOUNTING KIT	6115-00-463-9094

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Remove pages	Insert pages
ix and x	ix and x
2-1 and 2-2	2-1 and 2-2
2-13 and 2-14	2-13 and 2-14
3-5 through 3-8	3-5 through 3-8
3-34C and 3-34D	3-34C and 3-34D
3-55 and 3-56	3-55 and 3-56
3-79 and 3-80	3-79 and 3-80
-----	3-80A and 3-80B
3-81 and 3-82	3-81 and 3-82
3-86A and 3-86B	3-86A through 3-86C/3-86D
3-93 and 3-94	3-93 and 3-94
C-3 and C-4	C-3 and C-4

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TM 5-6115-465-12
NAVFAC P-8-625-12
TO-35C2-3-446-1
TM-06858B/06859D-12
C 11

CHANGE
NO 11

HEADQUARTERS
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HEADQUARTERS, U.S. MARINE CORPS
WASHINGTON, D.C., 17 August 1987

Operator and Organizational Maintenance Manual

GENERATOR SET, DIESEL ENGINE DRIVEN, TACTICAL SKID MTD, 30 KW, 3PHASE, 4 WIRE, 120/208 AND 240/416 VOLTS

DOD MODEL	CLASS	HERTZ	NSN
MEP 005A	UTILITY	50/60	6115-00-118-1240
MEP-104A	PRECISE	50/60	6115-00-118-1247
MEP-114A	PRECISE	400	6115-00-118-1248

INCLUDING AUXILLIARY EQUIPMENT

DOD MODEL	NOMENCLATURE	NSN
MEP-005AWF	WINTERIZATION KIT, FUEL BURNING	6115-00-463-9083
MEP-005AWE	WINTERIZATION KIT, ELECTRIC	6115-00-463-9085
MEP-005ALM	LOAD BANK KIT	6115-00-463-9088
MEP-005AWM	WHEEL MOUNTING KIT	6115-00-463-9094

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2-7 and 2-8	2-7 and 2-8
2-13 and 2-14	2-13 and 2-14
2-19 and 2-20	2-19 and 2-20
---	2-20.1 through 2-20.3/ 2-20.4

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TM5-6115-465-12
NAVFAC P-8-625-12
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C 10

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Operator and Organizational Maintenance Manual

GENERATOR SET, DIESEL ENGINE DRIVEN, TACTICAL SKID MTD. 30 KW, 3 PHASE, 4 WIRE, 120/208 AND 240/416 VOLTS

DOD MODEL	CLASS	HERTZ	NSN
MEP-005A	UTILITY	50/60	6115-00-118-1240
MEP-104A	PRECISE	50/60	6115-00-118-1247
MEP-114A	PRECISE	400	6115-00-118-1248

INCLUDING AUXILIARY EQUIPMENT

DOD MODEL	NOMENCLATURE	FSN
MEP-005AWF	WINTERIZATION KIT, FUEL BURNING	6115-00-463-9083
MEP-005AWE	WINTERIZATION KIT, ELECTRIC	6115-00-463-9085
MEP-005ALM	LOAD BANK KIT	6115-00-463-9088
MEP-005AWM	WHEEL MOUNTING KIT	6115-00-463-9094

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a/b	a/b
2-3 and 2-4	2-3 and 2-4
2-15 and 2-16	2-15 and 2-16
2-23 and 2-24	2-23 and 2-24
3-1 through 3-8	3-1 through 3-8
3-8A and 3-8B	---
3-17 and 3-18	3-17 and 3-18
3-43 and 3-44	3-43 and 3-44
4-1 and 4-2	4-1 and 4-2
D-3/D-4	D-3/D-4
E-1 and E-2	#-1 and E-2

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TM5-6115-465-12
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TM 5-6115-465-12
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Change No. 9

DEPARTMENT OF THE ARMY, THE NAVY,
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WASHINGTON, D.C., 28 February 1986

OPERATOR'S AND ORGANIZATIONAL MAINTENANCE MANUAL

GENERATOR SET, DIESEL ENGINE DRIVEN, TACTICAL SKID MTD. 30 KW, 3 PHASE, 4 WIRE, 120/208 AND 240/416 VOLTS

DOD MODEL	CLASS	HERTZ	NSN
MEP-005A	UTILITY	50/60	6115-00-118-1240
MEP-005A	PRECISE	50/60	6115-00-118-1247
MEP-114A	PRECISE	400	6115-00-118-1248

INCLUDING AUXILIARY EQUIPMENT

DOD MODEL	NOMENCLATURE	NSN
MEP-005AWF	WINTERIZATION KIT, FUEL BURNING	6115-00-463-9083
MEP-005AWE	WINTERIZATION KIT, ELECTRIC	6115-00-463-9085
MEP-005ALM	LOAD BANK KIT	6115-00-463-9088
MEP-005AWM	WHEEL MOUNTING KIT	6115-00-463-9094

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i through viii	i through x
1-1 and 1-2	1-1 and 1-2
	1-2A/1-2B
1-3 through 1-8	1-3 through 1-8
2-3 and 2-4	2-3 and 2-4
2-13 and 2-14	2-13 and 2-14
2-17 through 2-20	2-17 through 2-20
3-5 through 3-8	3-5 through 3-8
3-8A and 3-8B	3-8A and 3-8B
3-13 and 3-14	3-13 and 3-14
3-19 and 3-20	3-19 and 3-20
3-24A and 3-24B	3-24A and 3-24B
3-59 and 3-60	3-59 and 3-60
3-83 and 3-84	3-83 and 3-84
C-3 and C-4	C-3 and C-4
FO-2	FO-2
FO-3	FO-3
FO-5	FO-5

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Marine Corps:

MARCORPS CODE: AGC

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TM 5-6115-465-12
TO 35C2-3-446-1
NAVFAC P-8-625-12
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C 8

Change }
No. 8 }

DEPARTMENTS OF THE ARMY, THE NAVY,
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WASHINGTON, D.C., 20 January 1984

OPERATOR'S AND ORGANIZATIONAL MAINTENANCE MANUAL

GENERATOR SET, DIESEL ENGINE DRIVEN, TACTICAL SKID MTD. 30 KW, 3 PHASE, 4 WIRE, 120/208 AND 240/416 VOLTS

DOD MODEL	CLASS	HERTZ	NSN
MEP-005A	UTILITY	50/60	6115-00-118-1240
MEP-005A	PRECISE	50/60	6115-00-118-1247
MEP-114A	PRECISE	400	6115-00-118-1248

INCLUDING AUXILIARY EQUIPMENT

DOD MODEL	NOMENCLATURE	NSN
MEP-005AWF	WINTERIZATION KIT, FUEL BURNING	6115-00-463-9083
MEP-005AWE	WINTERIZATION KIT, ELECTRIC	6115-00-463-9085
MEP-005ALM	LOAD BANK KIT	6115-00-463-9088
MEP-005AWM	WHEEL MOUNTING KIT	6115-00-463-9094

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Warning	a/b	a/b
Chapter 1	1-1 and 1-2	1-1 and 1-2
Chapter 2	2-5 and 2-6	2-5 and 2-6
	2-25 and 2-26	2-25 and 2-26
Chapter 3	3-23 and 3-24	3-23 and 3-24
	3-53 and 3-54	3-53 and 3-54
	3-77 thru 3-82	3-77 thru 3-82
	3-85 and 3-86	3-85 thru 3-86B
	3-87 thru 3-90	3-87 thru 3-89/3-90
Appendix C	C-1 thru C-4	C-1 thru C-4
	FO-1, sht 2	FO-1, sht 2
	FO-1, sht 4	FO-1, sht 4
	FO-3	FO-3
	FO-5	FO-5

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Marine Corps:

MARCORPS CODE: AGC

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TM 5-6115-465-12
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TO 35C2-3-446-1
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C-7

Change No. 7

DEPARTMENTS OF THE ARMY, THE NAVY,
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WASHINGTON, D.C., *29 December 1980*

Operator's and Organizational Maintenance Manual

GENERATOR SET, DIESEL ENGINE DRIVEN, TACTICAL SKID MTD. 30 KW, 3 PHASE, 4 WIRE, 120/208 AND 240/416 VOLTS

DOD MODEL	CLASS	HERTZ	NSN
MEP-005A	UTILITY	50/60	6115-00-118-1240
MEP-104A	PRECISE	50/60	6115-00-118-1247
MEP-114A	PRECISE	400	6115-00-118-1248

INCLUDING AUXILIARY EQUIPMENT

DOD MODEL	NOMENCLATURE	NSN
MEP-005AWF	WINTERIZATION KIT, FUEL BURNING	6115-00-463-9083
MEP-005AWE	WINTERIZATION KIT, ELECTRIC	6115-00-463-9085
MEP-005ALM	LOAD BANK KIT	6115-00-463-9088
MEP-005AWM	WHEEL MOUNTING KIT	6115-00-463-9094

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Table of Contents	iii and iv	iii and iv
Chapter 3	3-5 thru 3-8	3-5 thru 3-8B
	3-24A/3-24B	3-24A and 3-24B
	3-25 and 3-26	3-25 and 3-26
	3-33 and 3-34	3-33 thru 3-34D

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NAVY NAVFAC P-8-625-12
AIR FORCE TO 35C2-3-446-1
MARINE CORPS TM 06858B/06858D-12
C 6

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No. 6

DEPARTMENTS OF THE ARMY, THE NAVY
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WASHINGTON, D.C., 28 May 1980

Operator and Organizational Maintenance Manual

GENERATOR SET, DIESEL ENGINE DRIVEN, TACTICAL, SKID MTD., 30 KW, 3 PHASE, 4 WIRE, 120/208 AND 240/416 VOLTS

DOD MODEL	CLASS	HERTZ	NSN
MEP-005A	UTILITY	50/60	6115-00-118-1240
MEP-104A	PRECISE	50/60	6115-00-118-1247
MEP-114A	PRECISE	400	6115-00-118-1248

INCLUDING AUXILIARY EQUIPMENT

DOD MODEL	NOMENCLATURE	NSN
MEP-005AWE	WINTERIZATION KIT, FUEL BURNING	6115-00-463-9083
MEP-005AWE	WINTERIZATION KIT, ELECTRIC	6115-00-463-9085
MEP-005ALM	LOAD BANK KIT	6115-00-463-9088
MEP-005AWM	WHEEL MOUNTING KIT	6115-00-463-9094

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List of Effective pages	A/B	A/B
Table of Contents	v and vi	v and vi
Appendix B	B-1 and B-2	B-1/B-2
Appendix E	E-1 and E-2	E-1 and E-2

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AIR FORCE TO 35C2-3-446-1
MARINE CORPS TM 06858B/06858D-12
C 5

CHANGE }
No. 5 }

DEPARTMENTS OF THE ARMY, THE NAVY
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WASHINGTON, DC., 25 April 1980

Operator and Organizational Maintenance Manual

GENERATOR SET, DIESEL ENGINE DRIVEN, TACTICAL, SKID MTD., 30 KW, 3 PHASE, 4 WIRE, 120/208 AND 240/416 VOLTS

DOD MODEL	CLASS	HERTZ	NSN
MEP-005A	UTILITY	50/60	6115-00-118-1240
MEP-104A	PRECISE	50/60	6115-00-118-1247
MEP-114A	PRECISE	400	6115-00-118-1248

INCLUDING AUXILIARY EQUIPMENT

DOD MODEL	NOMENCLATURE	NSN
MEP-005AWE	WINTERIZATION KIT, FUEL BURNING	6115-00-463-9083
MEP-005AWE	WINTERIZATION KIT, ELECTRIC	6115-00-463-9085
MEP-005ALM	LOAD BANK KIT	6115-00-463-9088
MEP-005AWM	WHEEL MOUNTING KIT	6115-00-463-9094

Current as of 29 November 1979

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	Remove pages	Insert pages
List of Effective Pages	A/B	A/B
Table of Contents	iii thru vi	iii thru vi
Chapter 1	1-7 and 1-8	1-7 and 1-8
Chapter 3	3-25 and 3-26	3-25 and 3-26
	3-33 and 3-34	3-33 thru 3-34.5/3-34.6
	3-53 thru 3-56	3-53 thru 3-56
	3-91 and 3-92	3-91 and 3-92

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TM 5-6115-465-12
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No. 4 }

DEPARTMENTS OF THE ARMY, THE NAVY
AND THE AIR FORCE
(INCLUDING US MARINE CORPS)
WASHINGTON, DC., 4 September 1979

Operator and Organizational Maintenance Manual

GENERATOR SET, DIESEL ENGINE DRIVEN, TACTICAL, SKID MTD., 30 KW, 3 PHASE, 4 WIRE, 120/208 AND 240/416 VOLTS

DOD MODEL	CLASS	HERTZ	NSN
MEP-005A	UTILITY	50/60	6115-00-118-1240
MEP-104A	PRECISE	50/60	6115-00-118-1247
MEP-114A	PRECISE	400	6115-00-118-1248

INCLUDING AUXILIARY EQUIPMENT

DOD MODEL	NOMENCLATURE	NSN
MEP-005AWE	WINTERIZATION KIT, FUEL BURNING	6115-00-463-9083
MEP-005AWE	WINTERIZATION KIT, ELECTRIC	6115-00-463-9085
MEP-005ALM	LOAD BANK KIT	6115-00-463-9088
MEP-005AWM	WHEEL MOUNTING KIT	6115-00-463-9094

Current as of 7 June 1979

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Chapter 3	3-63 and 3-64	3-63 and 3-64
Appendix B	B-1 thru B-4	B-1 and B-2
Appendix D		D-1 thru D-3/D-4
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Departments of the Army, the Navy
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OPERATOR AND ORGANIZATIONAL MAINTENANCE MANUAL

GENERATOR SET, DIESEL ENGINE DRIVEN, TACTICAL, SKID MTD., 30 KW, 3 PHASE, 4 WIRE, 120/208 AND 240/416 VOLTS

DOD MODEL	CLASS	HERTZ	NSN
MEP-005A	UTILITY	50/60	6115-00-118-1240
MEP-104A	PRECISE	50/60	6115-00-118-1247
MEP-114A	PRECISE	400	6115-00-118-1248

INCLUDING AUXILIARY EQUIPMENT

DOD MODEL	NOMENCLATURE	NSN
MEP-005AWE	WINTERIZATION KIT, FUEL BURNING	6115-00-463-9083
MEP-005AWE	WINTERIZATION KIT, ELECTRIC	6115-00-463-9085
MEP-005ALM	LOAD BANK KIT	6115-00-463-9088
MEP-005AWM	WHEEL MOUNTING KIT	6115-00-463-9094

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Operator and Organizational Maintenance Manual

GENERATOR SET, DIESEL ENGINE DRIVEN, TACTICAL, SKID MTD., 30 KW, 3 PHASE, 4 WIRE, 120/208 AND 240/416 VOLTS

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MEP-114A	PRECISE	400	6115-00-118-1248

INCLUDING AUXILIARY EQUIPMENT

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MEP-005AWM	WHEEL MOUNTING KIT	6115-00-463-9094

Current as of 7 September 1976

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1-1 and 1-2	1-1 and 1-2
3-37 and 3-38	3-37 and 3-38
3-39 and 3-40	3-39 and 3-40
3-43 and 3-44	3-43 and 3-44
3-67 and 3-68	3-67 and 3-68
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Operator and Organizational Maintenance Manual
GENERATOR SET, DIESEL ENGINE DRIVEN, TACTICAL SKID MTD. 30 KW, 3 PHASE, 4 WIRE, 120/208 AND 240/416 VOLTS

DOD MODEL	CLASS	HERTZ	NSN
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MEP-104A	PRECISE	50/60	6115-00-118-1247
MEP-114A	PRECISE	400	6115-00-118-1248

INCLUDING AUXILIARY EQUIPMENT

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MEP-005AWE	WINTERIZATION KIT, ELECTRIC	6115-00-463-9085
MEP-005ALM	LOAD BANK KIT	6115-00-463-9088
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WARNING

All specific cautions and warnings contained in this manual shall be strictly adhered to. Otherwise, severe injury, death and/or damage to the equipment may result.

HIGH VOLTAGE

is produced when this generator set is in operation.

DEATH

or severe burns may result if personnel fail to observe safety precautions. Do not operate this generator set until the ground terminal stud has been connected to a suitable ground. Disconnect the battery ground cable before removing and installing components on the engine or in the electrical control panel system. Do not attempt to service or otherwise make any adjustments, connections or reconnections of wires or cables until generator set is shut-down and completely deenergized.

DANGEROUS GASES

Batteries generate explosive gas during charging; therefore, utilize extreme caution, do not smoke, or use open flame in vicinity when servicing batteries. Use only Slave Receptacle (SR1) when extra cranking power is required; Incorrect method of slaving could cause arcing at battery terminals. Exhaust discharge contains noxious and deadly fumes. Do not operate generator sets in enclosed areas unless exhaust discharge is properly vented to the outside. When filling fuel tank, maintain metal-to-metal contact between filler nozzle and fuel tank. Do not smoke or use an open flame between filler nozzle and fuel tank. Do not smoke or use an open flame in the vicinity. Use extreme care, should a selenium rectifier malfunction, to avoid inhalation of poisonous fumes.

LIQUIDS UNDER PRESSURE

are generated as a result of operation of the generator set. Do not expose any part of the body to a high pressure leak in the fuel or hydraulic system of the generator set. Relieve pressure from radiator before removing radiator cap.

NOISE

operating level of this generator can cause hearing damage. Ear protectors, as recommended by the medical or safety officer, must be worn when working near this set.

BATTERY ACID

Battery electrolyte contains sulfuric acid which can cause severe burns. Always dilute electrolyte with water. Never pour electrolyte into water as high temperature will be generated and spattering of the electrolyte may result. If electrolyte comes in contact with skin or clothing, rinse immediately with clean water.

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DEPARTMENTS OF THE ARMY, THE NAVY
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Washington, DC., 31 January 1975

Page

LIST OF ILLUSTRATIONS ....

LIST OF TABLES ....

CHAPTER 1. INTRODUCTION 1-1

Section I. GENERAL 1-1

1-1. Scope 1-1
1-2. Forms and Records 1-1
1-2.1. Hand Receipt 1-1
1-3. Demolition to Prevent Enemy Use 1-1
1-4. Shipment and Storage 1-1

Section II. DESCRIPTION AND DATA 1-3

1-5. Description 1-3
1-6. Identification and Tabulated Data 1-5
1-7. Differences Between Models 1-8

CHAPTER 2. INSTALLATION AND OPERATION INSTRUCTIONS 2-1

Section I. SERVICE UPON RECEIPT OF MATERIAL 2-1

2-1. Inspecting and Servicing the Generator Set 2-1
2-2. Installation of Separately Packed Components 2-3
2-3. Installation Instructions 2-3
2-4. Generator Set Conversion Instructions 2-6

Section II. MOVEMENT TO A NEW WORK SITE 2-9

2-5. Dismantling the Generator Set for Movement 2-9
2-6. Reinstallation After Movement 2-9

Section III. CONTROLS AND INSTRUMENTS 2-11

2-7. General 2-11
2-8. Controls and Instruments 2-11

Section IV. OPERATION UNDER USUAL CONDITIONS 2-13

2-9. General 2-13
2-10. Starting the Generator Set 2-13
2-11. Stopping the Generator Set 2-14
2-12. Operation of Tactical Precise Generator Sets 2-14
2-13. Operation of Tactical Utility Generator Sets 2-20
2-14. Exercise of Engine on Standby Service 2-20

Section V. OPERATION UNDER UNUSUAL CONDITIONS 2-20

2-15. Operation in Extreme Cold (Below -25°F) 2-20
2-16. Operation in Extreme Heat (Up to 125°F) 2-21
2-17. Operation in Dusty or Sandy Areas 2-21

TABLE OF CONTENTS (CONT)

CHAPTER 2. INSTALLATION AND OPERATION INSTRUCTIONS (CONTINUED) — Page

2-18. Operation Under Rainy or Humid Conditions 2-21
2-19. Operation in Salt Water Areas 2-21
2-20. Operation at High Altitudes 2-23

Section VI. OPERATION OF EQUIPMENT USED IN CONJUNCTION 2-23
WITH THE GENERATOR SET 2-23

2-21. General 2-23
2-22. Fuel Burning Winterization Kit 2-23
2-23. Electric Winterization Kit 2-23
2-24. Wheel Mounting Kit 2-23
2-25. Load Bank Kit 2-23

CHAPTER 3. OPERATOR AND ORGANIZATIONAL MAINTENANCE INSTRUCTIONS 3-1

Section I. OPERATOR AND ORGANIZATIONAL MAINTENANCE REPAIR PARTS, TOOLS AND EQUIPMENT 3-1

3-1. Tools and Equipment (Not Applicable to Air Force) . 3-1
3-2. Organizational Maintenance Repair Parts 3-1

Section II. LUBRICATION 3-1

3-3. General Lubrication Information 3-1
3-4. Detailed Lubrication Information 3-1

Section III. PREVENTIVE MAINTENANCE CHECKS AND SERVICES 3-5

3-5. General 3-5
3-6. Preventive Maintenance Checks and Services (Army and Navy) 3-5

Section IV. OPERATOR'S MAINTENANCE 3-9

3-7. General 3-9
3-8. Batteries 3-9
3-9. Slave Receptacles 3-9
3-10. Breather Tube, Exhaust Pipe and Muffler 3-9
3-11. Convenience Receptacles and Circuit Breaker 3-9
3-12. Plate and Sleeve Assembly 3-9
3-13. Paralleling Receptacles 3-9
3-14. AC Voltmeter 3-9
3-15. Kilowatt (Percent Power) Meter 3-9
3-16. AC (Percent Rated Current) Ammeter 3-9
3-17. Frequency Meter 3-9
3-18. Control Panel Switches 3-9
3-19. Control Panel Gauges 3-10
3-20. Running Time Meter 3-10
3-21. Battery Charging Ammeter 3-10

TABLE OF CONTENTS (CONT)

CHAPTER 3. OPERATOR AND ORGANIZATIONAL MAINTENANCE INSTRUCTIONS (CONTINUED) Page

3-22. Generator Set Housing 3-10
3-23. Wiring Harnesses 3-10
3-24. Air Cleaner Assembly 3-10
3-25. Day Tank Assembly 3-10
3-26. Fuel Filter and Strainer Assembly 3-10
3-27. Start Aid Assembly 3-12
3-28. Fuel Transfer Pumps 3-12
3-29. Radiator Grille 3-12
3-30. Shutter Assembly and Thermostat 3-12
3-31. Radiator 3-12
3-32. Hydraulic Actuator (MEP 104A Only) 3-14
3-33. Hydraulic Sump and Filter (MEP 104A Only) 3-14
3-34. Engine Assembly 3-14
3-35. V-Belt 3-14
3-36. Battery Charging Alternator 3-14
3-37. Speed Switch and Adapter 3-14
3-38. Hydraulic Oil Pump (MEP 104A Only) 3-14
3-39. Oil Level Gauge and Filler Tube 3-14
3-40. Starter Assembly 3-14
3-41. Oil Pressure Transmitter 3-14
3-42. Lube Oil Filter 3-14
3-43. Secondary Fuel Filter 3-14
3-44. Fuel Injection Pump 3-15
3-45. Fan Assembly 3-15
3-46. Water Pump Assembly 3-15
3-47. Coolant Temperature Transmitter 3-15
3-48. Oil Pan Assembly 3-15
3-49. Main Fuel Tank 3-15
3-50. Paralleling Cable 3-18
3-51. Auxiliary Fuel Line 3-18

Section V. TROUBLESHOOTING 3-18

3-52. General 3-18

Section VI. FIELD EXPEDIENT REPAIRS 3-24

3-53. General 3-24
3-54. Fuel is not Strained 3-24
3-55. Housing Filled With Smoke 3-24
3-56. Engine Overheating 3-24
3-57. Loss of Coolant 3-24
3-58. Battery Charging Ammeter Shows No Charge 3-24
3-59. Loss of Frequency Control (Tactical Precise Sets Only) 3-24

Section VII. ELECTROMAGNETIC INTERFERENCE SUPPRESSION 3-25

3-60. General Methods Used to Obtain Proper Suppression . 3-25

TABLE OF CONTENTS (CONT)

CHAPTER 3. OPERATOR AND ORGANIZATIONAL MAINTENANCE INSTRUCTIONS (CONTINUED) Page

3-61. Interference Suppression Components 3-25
3-62. Replacement of Electromagnetic Interference Components 3-25
3-63. Testing of Interference Suppression Components 3-25

Section VIII. ORGANIZATIONAL MAINTENANCE OF THE ENGINE ELECTRICAL SYSTEM 3-25

3-64. General 3-25
3-65. Batteries 3-25
3-66. Slave Receptacle 3-27
3-67. Starter Assembly 3-29
3-67A. Starter Assembly (Effective with Serial No. RZ70001 and KZ00001 thru KZ02752) 3-33
3-68. Battery Charging Alternator 3-34C
3-69. Speed Switch 3-36
3-70. Coolant Temperature Transmitter 3-36
3-71. Over-temperature Switch 3-37
3-72. Oil Pressure Transmitter 3-37
3-73. Low Oil Pressure Switch 3-39
3-74. Day Tank Fuel Level and Low Fuel Cutoff Switch 3-39
3-75. Fuel Solenoid Valve 3-40
3-76. Engine Wiring Harness Assembly 3-40

Section IX. ORGANIZATIONAL MAINTENANCE OF THE ENGINE FUEL SYSTEM 3-41

3-77. General 3-41
3-78. Fuel Transfer Pumps 3-41
3-79. Fuel Strainer and Filter Assembly 3-41
3-80. Day Tank Assembly 3-43
3-81. Secondary Fuel Filter 3-44
3-82. Fuel Injection Nozzle Holders and Lines 3-47
3-83. Fuel Lines and Fittings 3-47
3-84. Start Aid Assembly 3-47

Section X. ORGANIZATIONAL MAINTENANCE OF THE ENGINE COOLING SYSTEM 3-51

3-85. General 3-51
3-86. Grille 3-51
3-87. Shutter Control Thermostat 3-51
3-88. Radiator 3-53
3-89. Shutter Assembly 3-53
3-90. V-Belt 3-53
3-91. Cooling Fan 3-54
3-92. Water Pump 3-55
3-93. Coolant Thermostat and Housing 3-55

TABLE OF CONTENTS (CONT)

CHAPTER 3. OPERATOR AND ORGANIZATIONAL MAINTENANCE INSTRUCTIONS (CONTINUED) Page

Section XI. ORGANIZATIONAL MAINTENANCE OF THE ENGINE LUBRICATION SYSTEM 3-56

3-94. General 3-56
3-95. Lubrication of Oil Filter Assembly 3-56

Section XII. ORGANIZATIONAL MAINTENANCE OF THE HYDRAULIC SYSTEM 3-59

3-96. General 3-59
3-97. Hydraulic Sump and Filter 3-59
3-98. Hydraulic Actuator Unit Filter 3-59
3-99. Hydraulic Lines 3-59

Section XIII. ORGANIZATIONAL MAINTENANCE OF THE INTAKE EXHAUST SYSTEMS AND BREATHER TUBE 3-63

3-100. General 3-63
3-101. Air Cleaner Assembly 3-63
3-102. Muffler 3-63
3-103. Breather and Breather Tube 3-64

Section XIV. ORGANIZATIONAL MAINTENANCE OF THE ENGINE ASSEMBLY 3-65

3-104. General 3-65
3-105. Crankshaft Pulley 3-65
3-106. Intake Manifold 3-65
3-107. Exhaust Manifold 3-65
3-108. Rocker Arm Assembly 3-65
3-109. Valve Tappet Clearance Adjustment 3-67
3-110. Engine Testing 3-67

Section XV. ORGANIZATIONAL MAINTENANCE OF THE GENERATOR SET CONTROLS 3-68

3-111. General 3-68
3-112. Control Cubicle Assembly 3-68
3-113. Fault Locating Indicator 3-80
3-114. Manual Speed Control 3-80
3-115. DC Control Circuit Breaker 3-82
3-116. Load Measuring Unit 3-82
3-117. Governor Control Unit (Precise Sets Only) 3-84
3-118. Interconnecting Wiring Harness 3-84

Section XVI. ORGANIZATIONAL MAINTENANCE OF THE GENERATOR ELECTRICAL SYSTEM 3-85

3-119. General 3-85

3-120. Voltage Reconnection Board 3-85
3-121. Main load Contactor 3-86
3-122. Current Transformer Assemblies 3-86B
3-123. Load Terminal Board Assembly 3-86B
3-124. Convenience Receptacle and Circuit Breaker 3-86B
3-125. Paralleling Receptacles 3-86B
3-126. Tactical Relay Assembly 3-87
3-127. Precise Relay Assembly (50/60 Hz Precise Sets) 3-87
3-128. Special Relay Assembly (50/60 Hz Precise and Utility Sets) 3-87
3-129. Special Relay Assembly (400 Hz Precise Sets) 3-87
3-130. Precise Relay Assembly (400 Hz Precise Sets) 3-87

Section XVII. ORGANIZATIONAL MAINTENANCE OF THE GENERATOR ASSEMBLY 3-89

3-131. General 3-89
3-132. Organizational Maintenance Inspection of Generator Assembly 3-89

Section XVIII. ORGANIZATIONAL MAINTENANCE OF THE HOUSING AND SKID BASE ASSEMBLIES 3-89

3-133. General 3-89
3-134. Doors, Covers, and Panels 3-89
3-135. Plate and Sleeve Assembly 3-89
3-136. Lifting Frame 3-94
3-137. Skid Base Assembly 3-94

XIX. TOOL STOWAGE BOX 3-95

3-138. General 3-95

XX. AUXILIARY FUEL LINE 3-96

3-139. General 3-96
3-140. Repair of Auxiliary Fuel Line 3-96

XXI. PARALLELING CABLE 3-97

3-141. General 3-97
3-142. Maintenance of Paralleling Cable 3-97

CHAPTER 4. MATERIAL USED IN CONJUNCTION WITH THE GENERATOR SET 4-1

Section I. GENERAL 4-1

4-1. Scope 4-1
4-2. Service Upon Receipt of Material 4-1

II. FUEL BURNING WINTERIZATION KIT 4-1

4-3. General 4-1
4-4. Fuel Burning Winterization Kit Installation and Replacement 4-1
4-5. Preventive Maintenance Checks and Services 4-3
4-6. Troubleshooting 4-4
4-7. Operator Inspection and Service of Fuel Burning Winterization Kit 4-4
4-8. Organizational Maintenance of Fuel Burning Winterization Kit 4-4

III. ELECTRIC WINTERIZATION KIT 4-11

4-9. General 4-11
4-10. Electric Winterization Kit Installation and Replacement 4-11
4-11. Preventive Maintenance Checks and Services 4-14
4-12. Troubleshooting 4-14
4-13. Operator's Maintenance of Electric Winterization Kit 4-14
4-14. Organizational Maintenance of Electric Winterization Kit 4-16

IV. WHEEL MOUNTING KIT 4-22

4-15. General 4-22
4-16. Preventive Maintenance Checks and Services 4-22
4-17. Troubleshooting 4-22
4-18. Operator's Maintenance of Wheel Mounting Kit 4-22
4-19. Organizational Maintenance of Wheel Mounting Kit 4-26

V. LOAD BANK KIT 4-29

4-20. General 4-29
4-21. Installation, Testing, and Replacement of Load Bank 4-29
4-22. Preventive Maintenance Checks and Services 4-31
4-23. Troubleshooting 4-31
4-24. Operator Maintenance Inspection of Load Bank 4-31
4-25. Organizational Maintenance of Load Bank 4-31

APPENDIX A. REFERENCES

APPENDIX B. COMPONENTS OF END ITEM LIST

APPENDIX C. MAINTENANCE ALLOCATION CHART (ARMY ONLY)

APPENDIX D. MAINTENANCE AND OPERATING SUPPLIES (ARMY ONLY)

APPENDIX E. ADDITIONAL AUTHORIZATION LIST

LIST OF ILLUSTRATIONS

Figure	Title	Page
1.1.	Engine Generator Set, Right-Front, Three-Quarter View	1-2
1-1.1	Engine Generator Set Right Front. Electric Governor	1-2A
1-2.	Engine Generator Set, Left Rear, Three-Quarter View	1-4
1-3.	Fuel System Diagram	1-9
1-4.	Hydraulic System Diagram	1-9
2-1.	Installation Plan	2-4
2-2.	Ground Connections	2-5
2-3.	Load Terminal Board Assembly	2-7
2-4.	Paralleling for Load Sharing	2-7
2-5.	Paralleling for Load Transfer	2-8
2-6.	Voltage Reconnection Board	2-8
2-7.	Generator Set Controls and Instruments	2-10
2-8.	Starting the Generator Set	2-15
2-9.	Stopping the Generator Set	2-18
2-10.	Operating the Fuel Burning Winterization Kit	2-22
2-11.	Operating the Electric Winterization Kit	2-24
2-12.	Using the Wheel Mounting Kit	2-25
2-13.	Operating the Load Bank	2-26
3-1.	Lubrication Order	3-2
3-2.	Servicing the Engine Oil Filter	3-4
3-3.	Servicing the Engine Air Cleaner	3-11
3-4.	Servicing Fuel Strainer and Filter Housing	3-11
3-5.	Radiator Hose Replacement	3-13
3-6.	Servicing Secondary Fuel Filter	3-16
3-7.	Main Fuel Tank Inspection and Service	3-17
3-7A.	Emergency Conversion Connections	3-24A
3-7B.	Emergency Conversion Connections (effective with Serial No. RZ70001 and KZ00001 thru KZ02752)	3-24B
3-8.	Battery Installation	3-26
3-9.	Slave Receptacle, Removal and Installation	3-28
3-10.	Starter Assembly, Removal	3-29
3-11.	Starter Brushes Replacement	3-30
3-12.	Starter Solenoid Replacement	3-32
3-12A.	Starter Solenoid Replacement (effective with Serial No. RZ70001)	3-34
3-12B.	Starter Brushes Replacement (effective with Serial No. RZ70001)	3-34B
3-13.	Battery Charging Alternator Removal and Installation	3-34D
3-14.	Alternator Test Leads Attachment	3-35
3-15.	Alternator Test Circuit	3-35
3-16.	Day Tank Fuel Level and Low Fuel Cutoff Switch and Fuel Solenoid Valve Removal and Installation	3-38
3-17.	Fuel Transfer Pumps, Service and Replacement	3-42
3-18.	Fuel Strainer and Filter Assembly, Removal and Installation	3-43
3-19.	Day Tank Assembly, Removal and Installation	3-44
3-20.	Secondary Fuel Filter Assembly, Removal and Installation	3-45

LIST OF ILLUSTRATIONS (CONT)

Figure	Title	Page
3-21.	Fuel Injection Nozzle Holders and Lines, Exploded View	3-46
3-22.	Fuel Lines and Fittings, Exploded View	3-48
3-23.	Start Aid Assembly, Removal and Installation	3-50
3-24.	Grille, Radiator, and Shutter Assembly, Exploded View	3-52
3-25.	Water Pump, Cooling Fan and V-Belt, Removal and Installation	3-54
3-26.	Coolant Thermostat, Removal and Installation	3-55
3-27.	Lubrication Oil Filter Assembly, Removal and Installation	3-57
3-28.	Hydraulic Sump and Filter Service	3-58
3-29.	Servicing the Hydraulic Actuator Unit Filter	3-60
3-30.	Hydraulic Lines and Fittings, Exploded View	3-61
3-31.	Air Cleaner Assembly, Exploded View	3-62
3-32.	Muffler, Exploded View	3-62
3-33.	Breather and Breather Tube, Exploded View	3-64
3-34.	Intake Manifold, Removal and Installation	3-66
3-35.	Exhaust Manifold, Removal and Installation	3-66
3-36.	Rocker Arm Assembly Inspection and Valve Tappet Clearance Adjustment	3-67
3-37.	Control Cubicle Assembly, Exploded View	3-69
3-38.	Volts-Amps Transfer Switch Schematic Diagram	3-75
3-39.	Fault Locating Indicator Lamp and Fuse Replacement	3-80A
3-91.1	Fault Locating Indicator, Exploded View	3-80B
3-40.	Manual Speed Control, Exploded View	3-82
3-41.	DC Circuit Breaker, Removal and Installation	3-83
3-42.	Load Measuring Unit, Removal and Installation	3-83
3-43.	Voltage Reconnection Board, Removal and Installation	3-86
3-43A.	Main Load Contactor, Removal	3-86A
3-43B.	Terminal Clip Replacement	3-86B
3-44.	Convenience Receptacle and Circuit Breaker, Removal and Installation	3-87
3-45.	Paralleing Receptacles, Removal and Installation	3-88
3-46.	Housing Assembly, Exploded View	3-91
3-47.	Plate and Sleeve Assembly, Exploded View	3-93
3-48.	Tool Stowage Box	3-95
3-49.	Repair of Auxiliary Fuel Line	3-96
3-50.	Repair of Paralleling Cable	3-97
4-1.	Fuel Burning Winterization Kit Installation	4-2
4-2.	Fuel Burning Winterization Kit Heater Assembly, Inspection and Service	4-7
4-3.	Fuel Burning Winterization Kit Heater Control Assembly Maintenance ...	4-8
4-4.	Fuel Burning Winterization Kit Heater Assembly Maintenance	4-10
4-5.	Electric Winterization Kit Installation	4-12
4-6.	Electric Winterization Kit Control Assembly Indicator Lamp Fuse Replacement	4-17
4-7.	Electric Winterization Kit Control Assembly, Exploded View	4-18
4-8.	Electric Winterization Kit Wiring Harness, Dwg. No. 72-2855	4-21
4-9.	Wheel Mounting Kit, Front Axle and Tow Bar Assembly, Exploded View	4-25
4-10.	Wheel Mounting Kit, Wheels and Brakes, Exploded View	4-28
4-11.	Load Bank Installation	4-30
4-12.	Load Bank Assembly, Exploded View	4-34
4-13.	Load Bank Wiring Diagram, Dwg. No. 72-2826	4-36
4-14.	Load Bank Schematic Diagram, Dwg. No. 72-2827	4-38
FO-1.	AC and DC, 15 and 30 KW, 50/60 and 400 Hz, Precise and Utility, Wiring Diagram, Dwg. No. 72-2205 (4 sheets)	FO-1
FO-2.	AC Schematic Diagram, 15 and 30 KW, Precise Generator Sets, Dwg. No. 72-2200	FO-2
FO-3.	DC Schematic Diagram, 15 and 30 KW, Precise Generator Sets, Dwg. No. 72-2269	FO-3

LIST OF ILLUSTRATIONS (CONT)

Figure	Title	Page
FO-4.	AC Schematic Diagram, 15 and 30 KW, Utility Generator Sets, Dwg. No. 72-2295	FO-4
FO-5.	DC Schematic Diagram, 15 and 30 KW, Utility Generator Sets, Dwg. No. 72-2277	FO-5

LIST OF TABLES

Table	Title	Page
1-1.	Differences in Performance Characteristics	1-10
2-1.	Freezing Points, Composition and Specific Gravities of Military Anti-Freeze Materials	2-2
3-1.	Preventive Maintenance Checks and Services	3-6
3-2.	Trouble Shooting	3-18
3-3.	Specific Gravity Temperature Corrections	3-27
3-4.	State of Charge With Specific Gravity Corrected to 80°F	3-27
3-5.	Alternator Voltages at Ambient Temperature	3-36
4-1.	Fuel Burning Winterization Kit Preventive Maintenance Checks and Services	4-5
4-2.	Fuel Burning Winterization Kit Trouble Shooting	4-6
4-3.	Electric Winterization Kit Preventive Maintenance Checks and Services	4-15
4-4.	Electric Winterization Kit Trouble Shooting	4-16
4-5.	Wheel Mounting Kit Preventive Maintenance Checks and Services	4-23
4-6.	Wheel Mounting Kit Trouble Shooting	4-24
4-7.	Load Bank Preventive Maintenance Checks and Services	4-32
4-8.	Load Bank Trouble Shooting	4-33

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1-1. Scope

a. This manual is published for the information and guidance of personnel to whom the 30 kW Diesel Engine Driven Generator Set is issued. It contains instructions for operation and organizational maintenance of 50/60 Hz (Mode I) Tactical Precise (Class 1) and 400 Hz (Mode II) Tactical Precise (Class 1) models of the generator set. Also included are descriptions of major components and their functions in relation to other components.

b. Appendix A contains a list of reference publications applicable to this manual.

NOTE

Marine Corps users should refer to the SL-1-2 under the equipment I D numbers for a listing of related publications. They should refer to the applicable stock list for issue of maintenance and operating supplies.

c. Appendix B (Army Only) lists integral components of and basic issue items. Appendix C contains the Maintenance Allocation Chart which determines level of maintenance for Army users. Appendix D lists maintenance and operating supplies. Appendix E lists additional items that are authorized.

NOTE

Air Force users shall accomplish maintenance at user level consistent with their capability in accordance with policies established by AFM 66-1.

1-2. Forms and Records

NOTE

This manual is used by Army, Air Force, Navy, and Marine Corps personnel. Use of forms as directed in this manual will be accomplished only by personnel of that service to which such forms apply.

a. Maintenance forms and records used by Army personnel will be only those prescribed by DA PAM 738-750. Those to be used by Marine Corps personnel are prescribed in the current edition of TM 4700-15/1. Air Force forms and records used will be those prescribed by AFM 66-1 and the applicable 00-20 Series Technical Orders. Navy users should refer to their appropriate specifications or publications to determine the applicable maintenance forms and records to be used.

b. Report of errors, omissions, and recommendations for improvement of this manual by its user is encouraged. Such reports should be submitted by various service personnel as follows:

(1) Air Force. AFTO Form 22 direct to Commander, Sacramento Air Materiel Area, MMST, McClellan Air Force Base, CA 95652, in accordance with TO-00-S-1.

(2) Army. DA Form 2028 direct to Commander, US Army Troop Support Command, ATTN: AMSTR-MCTS, 4300 Goodfellow Boulevard, St. Louis, MO 63120-1798.

(3) Marine Corps. NAVMC direct to Commandant, US Marine Corps, ATTN: (Code LMO-1), Washington, DC 20380

(4) Navy by letter direct to Commanding Officer Naval Construction Battalion Center, ATTN: Code 15, Port Hueneme, CA 93043

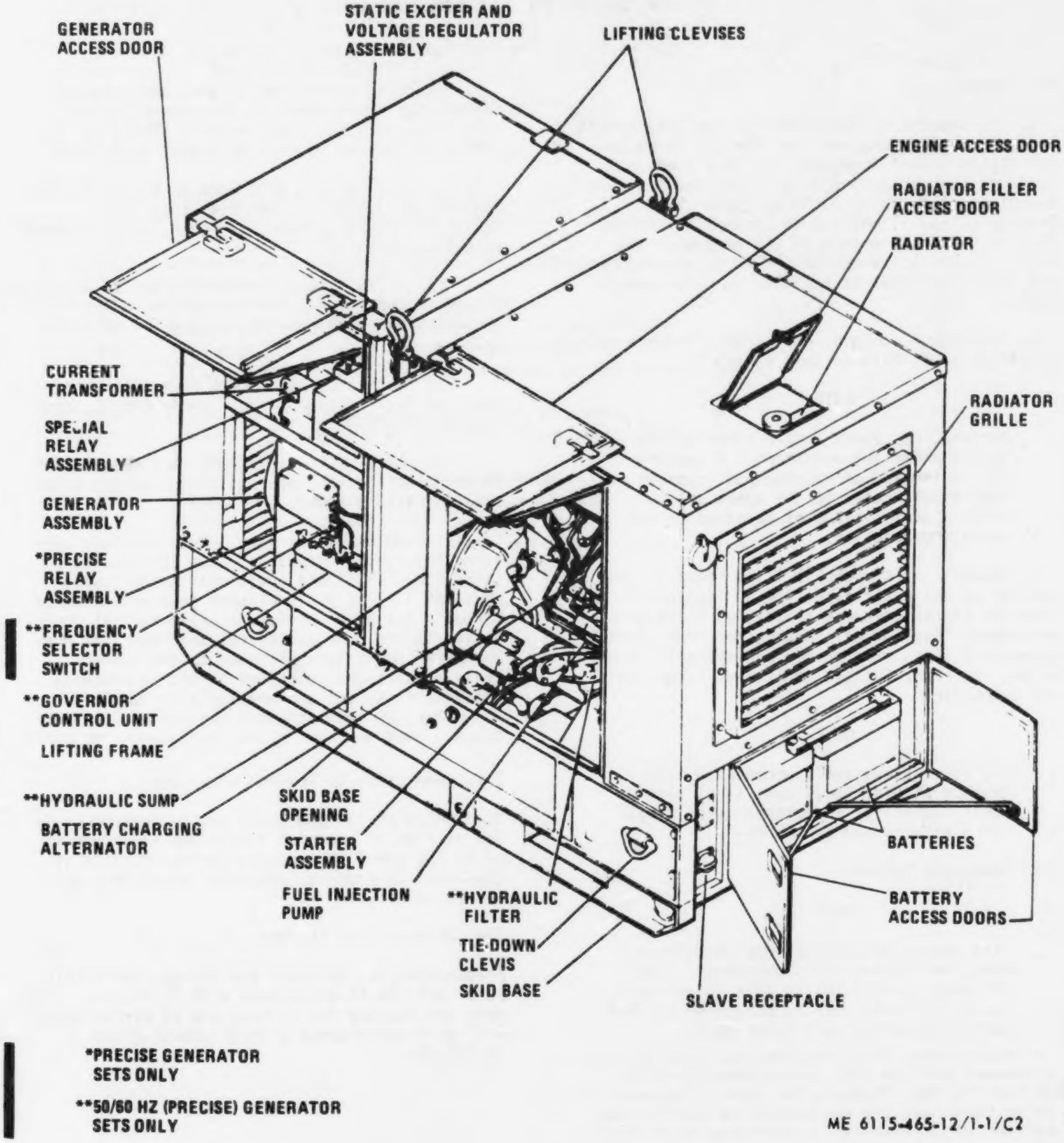
1-2.1. Hand Receipt. Army. Hand receipts covering the Components of End Item (COEI), Basic Issue Items (BII) and Additional Authorization List (AAL) items are published in a Hand Receipt Manual. The Hand Receipt Manual numerical designation is the same as the related Technical Manual with the letters HR added to the number. These manuals are published to aid in property accountability and are available through: Commander, US Army Adjutant General Publication Center, 2800 Eastern Blvd., Baltimore, MD 21220.

1-3. Demolition to Prevent Enemy Use

Demolition of the generator set to prevent enemy use will be in accordance with the requirements of TM 750-244-3 (Procedures for Destruction of Equipment to Prevent Enemy Use for US Army and US Marine Corps).

1-4. Shipment and Storage

Preparation for shipment and storage for US Air Force will be in accordance with TO 35-1-4. Shipment and Storage for US Army and US Marine Corps will be in accordance with TB 740-97-2 and TM 740-90-1.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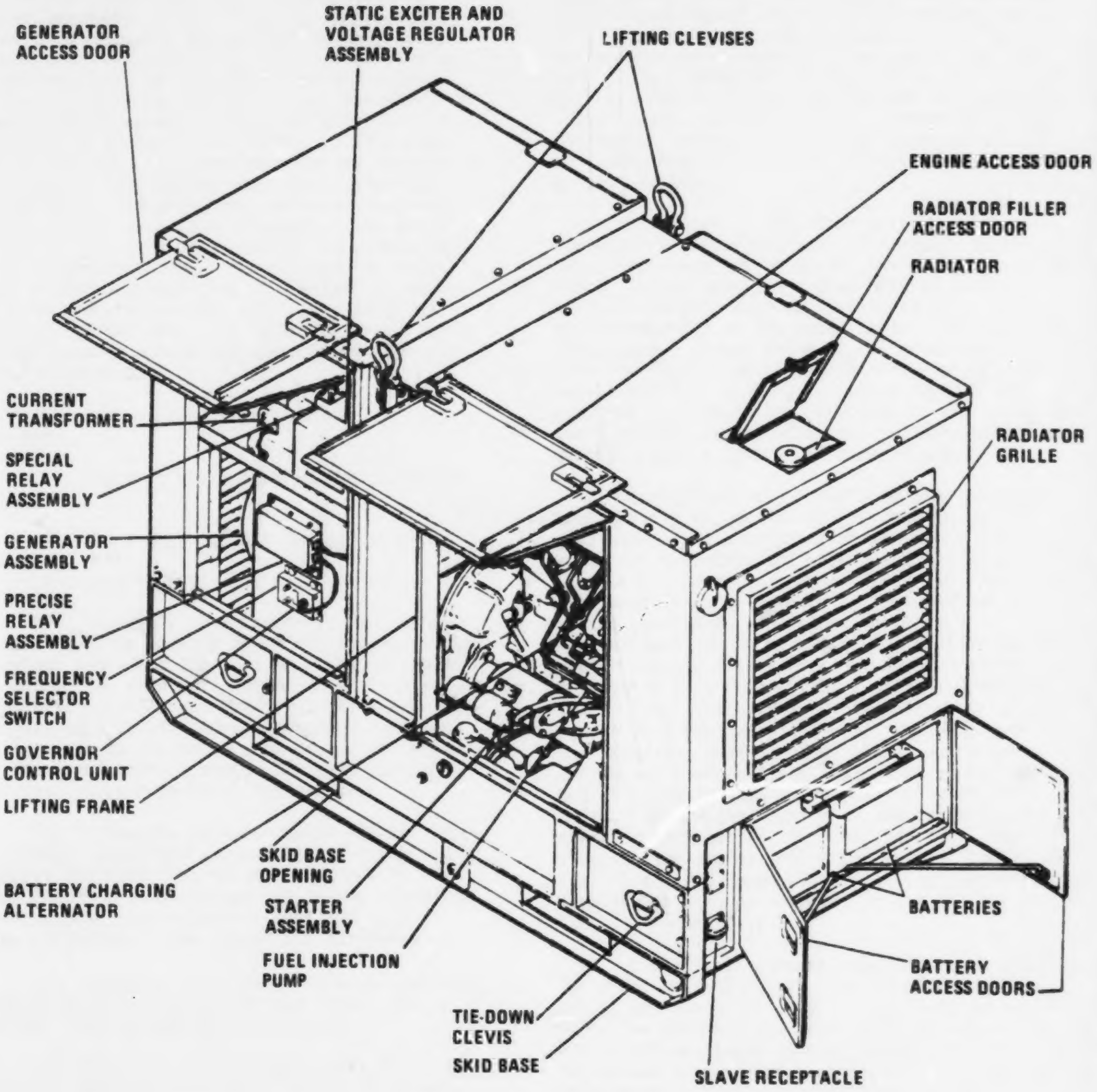
STATIC EXCITER AND VOLTAGE REGULATOR ASSEMBLY
LIFTING CLEVISES
ENGINE ACCESS DOOR
RADIATOR FILLER ACCESS DOOR
RADIATOR
RADIATOR GRILLE
CURRENT TRANSFORMER
SPECIAL RELAY ASSEMBLY
GENERATOR ASSEMBLY
*PRECISE RELAY ASSEMBLY
**FREQUENCY SELECTOR SWITCH
**GOVERNOR CONTROL UNIT
LIFTING FRAME
**HYDRAULIC SUMP
BATTERY CHARGING ALTERNATOR
SKID BASE OPENING
STARTER ASSEMBLY
FUEL INJECTION PUMP
**HYDRAULIC FILTER
TIE-DOWN CLEVIS
SKID BASE
SLAVE RECEPTACLE
BATTERIES
BATTERY ACCESS DOORS
*PRECISE GENERATOR SETS ONLY
**50/60 HZ (PRECISE) GENERATOR SETS ONLY
ME 6115-465-12/1-1/C2

Figure 1-1. Engine Generator Set Right Front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STATIC EXCITER AND VOLTAGE REGULATOR ASSEMBLY
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STARTER ASSEMBLY
FUEL INJECTION PUMP
TIE-DOWN CLEVIS
SKID BASE
SLAVE RECEPTACLE
BATTERIES
BATTERY ACCESS DOORS

Figure 1-1.1 Engine Generator Set Right Front, Electric Governor

Section II. DESCRIPTION AND DATA

1-5. DESCRIPTION.

a. General. The generator sets, models MEP-005A, MEP-104A and MEP-114A (figure 1-1, 1-1.1 and 1-2) are fully enclosed, self-contained, skid mounted, portable units. They are equipped with controls, instruments and accessories necessary for operation as single unit or in parallel with one or more units of the same class and mode. Each set is equipped with engine oil pan heating elements and necessary connections for field installation of winterization kits. Lifting clevises for hoisting the generator set are located at the top of the lifting frame and center support assembly. Tubular cross members, that will accept a chain, have been provided at the front and rear of the skid base assembly to permit towing for short distances. Mobility of the units may be obtained by mounting on trailers or equipping with a wheel mounting kit. To extend the capability of the generator sets, they have also been designed to accept and operate with the following optional kits:

(1) Fuel Burning Winterization Kit (paragraph 4-3).

(2) Electric Winterization Kit (paragraph 4-9).

(3) Wheel Mounting Kit (paragraph 4-15).

(4) Load Bank Kit (paragraph 4-20).

(5) Automatic Transfer Panel 50/60 Hz: Monitors 50/60 Hz primary power and automatically starts and transfers the load to a standby generator set in the event of abnormal primary power fluctuation or failure. Continues sensing primary power and upon satisfactory resumption, will return the load to the primary power source, shutoff and recycle the generator set to a standby condition. (See Appendix A for manual.)

(6) Automatic Transfer Panel 400 Hz: Monitors 400 Hz power and automatically starts and transfers the load from an operating 400 Hz generator set to a like standby set in the event the operating set load contactor opens due to a faulty condition. (See Appendix A for manual.)

(7) Remote Control Box: Permits starting and stopping of the generator set from a remote location. (See Appendix A for manual.)

(8) Auxiliary Fuel Burning Winterization: Provides a dependable external source of battery power for starting of the generator set in ambient temperatures from -25°F to -65°F. (See Appendix A for manual.)

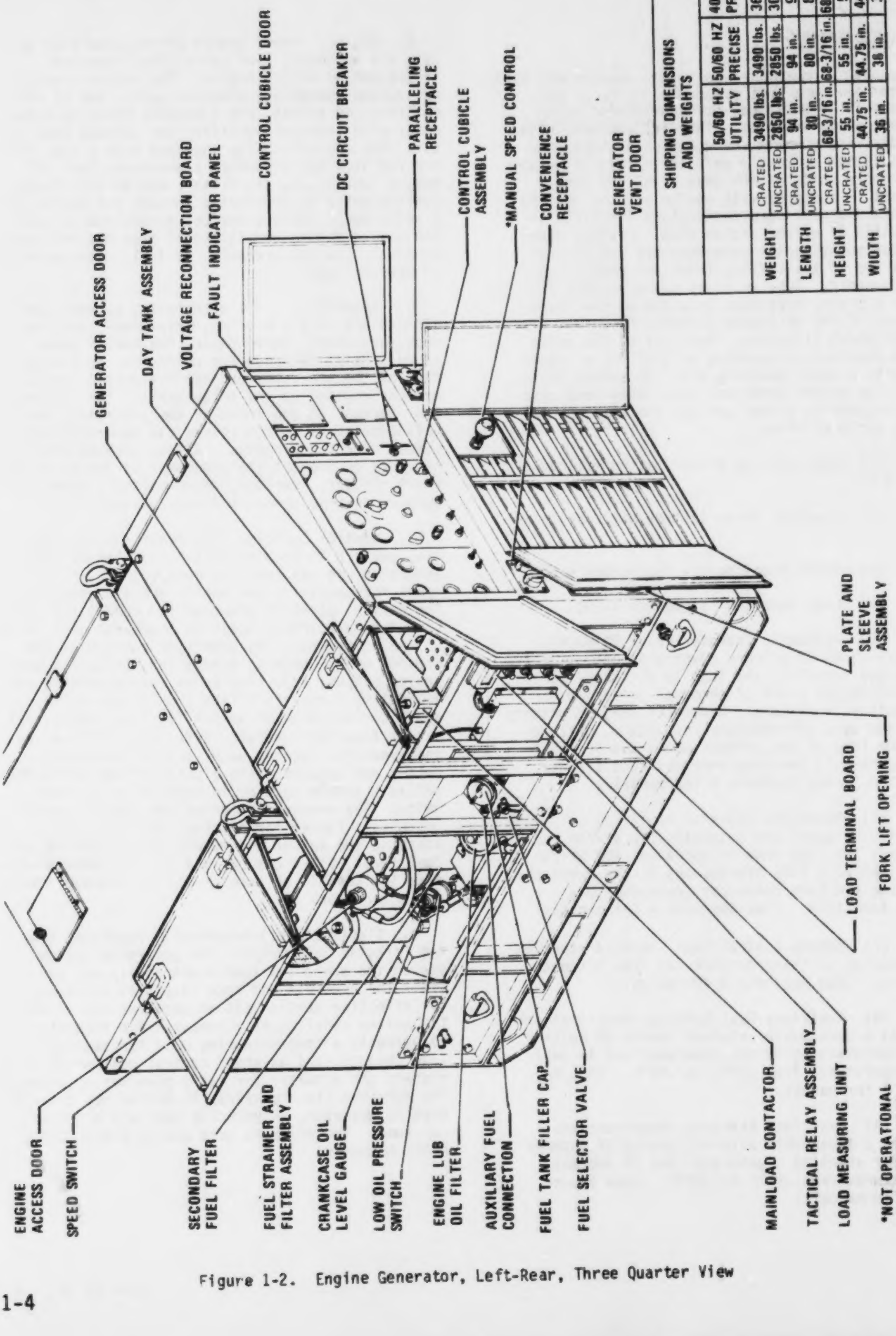
(9) Auxiliary Electric Winterization: Provides a dependable external source of battery power for starting a generator set in ambient temperatures from -25°F to -65°F. (See Appendix A for manual.)

b. Engine. Power source of the generator set is a six cylinder, four cycle, fuel injected, liquid cooled diesel engine. The engine electrical system contains a cranking motor, two 12 volt batteries in series, and a battery charging alternator with integral rectifier and voltage regulator. The engine is also equipped with a fuel filter and strainer assembly, a secondary fuel filter, a lubricating oil filter, and an air cleaner. Cooling water is circulated through the engine by a water pump. Safety devices automatically stop the engine during conditions of high coolant temperature, low oil pressure, no fuel, over-speed, or over-voltage.

c. Generators. The alternating current generators are single bearing, drip-proof, synchronous, brushless, three phase, fan cooled generators. Rated voltages are maintained by excitation of the generator-exciter field by a static exciter mounted on the relay table. The cooling fan, located at the front of the generator, impels cooling air which enters the generator and passes over the windings. Safety devices are provided to protect the generator in the event of short circuit, overload, under-voltage, under-frequency, reverse power, and over-voltage.

d. Control Cubicle. The generator set control cubicle is located at the rear top of the generator set and contains controls and instruments for operating the engine and the generator. The control panel is grounded to protect the operator from electrical shock in the event of a short in the equipment. The generator section of the control panel contains meters for monitoring generator output, adjusting knobs for increasing and decreasing frequency (Class 1 only) and voltage, and a circuit breaker switch for interrupting all output from the generator set. Also included on the generator control panel are an operations switch and synchronizing lights for operating the set as a single unit or in parallel with other units. The engine section of the control panel contains switches for priming, starting, and stopping the engine and meters for monitoring set fuel level, oil pressure, and coolant temperature. Also included is an ammeter for the battery charging alternator.

e. Electric/Electro-Hydraulic Governing System (Precise Sets Only). The governing system senses the speed and load electrically and provides the controls and load responses necessary for effective single unit or parallel operation. The system consists of a rheostat for frequency adjustment, a load measuring unit for sensing load changes, and governor control unit which signals the actuator for rapid governor response. The MEP-104A Electro-Hydraulic System has a hydraulic actuator, a hydraulic pump and a hydraulic sump. The MEP-114A sets use an Electric-Magnetic Actuator.


ENGINE ACCESS DOOR
SPEED SWITCH
SECONDARY FUEL FILTER
FUEL STRAINER AND FILTER ASSEMBLY
CRANKCASE OIL LEVEL GAUGE
LOW OIL PRESSURE SWITCH
ENGINE LUB OIL FILTER
AUXILIARY FUEL CONNECTION
FUEL TANK FILLER CAP
FUEL SELECTOR VALVE
MAINLOAD CONTACTOR
TACTICAL RELAY ASSEMBLY
LOAD MEASURING UNIT
*NOT OPERATIONAL ON PRECISE SETS
LOAD TERMINAL BOARD
FORK LIFT OPENING
PLATE AND SLEEVE ASSEMBLY
GENERATOR ACCESS DOOR
DAY TANK ASSEMBLY
VOLTAGE RECONNECTION BOARD
FAULT INDICATOR PANEL
CONTROL CUBICLE DOOR
DC CIRCUIT BREAKER
PARALLELING RECEPTACLE
CONTROL CUBICLE ASSEMBLY
*MANUAL SPEED CONTROL
CONVENIENCE RECEPTACLE
GENERATOR VENT DOOR

SHIPPING DIMENSIONS AND WEIGHTS

		50/60 HZ UTILITY	50/60 HZ PRECISE	400 HZ PRECISE
WEIGHT	CRATED	3490 lbs.	3490 lbs.	3640 lbs.
	UNCRATED	2850 lbs.	2850 lbs.	3000 lbs.
LENGTH	CRATED	94 in.	94 in.	94 in.
	UNCRATED	80 in.	80 in.	80 in.
HEIGHT	CRATED	68-3/16 in.	68-3/16 in.	68-3/16 in.
	UNCRATED	55 in.	55 in.	55 in.
WIDTH	CRATED	44.75 in.	44.75 in.	44.75 in.
	UNCRATED	36 in.	36 in.	36 in.

Figure 1-2. Engine Generator, Left-Rear, Three Quarter View

f. Mechanical Governing System (Utility Sets Only). The mechanical governing system provides the controls and load responses necessary for efficient single unit, or parallel, operation of utility generator sets. Engine rpm and set frequency are controlled by the mechanical governor, an integral part of the fuel injection pump, which actuates the fuel metering valve. Adjustment of engine rpm and set frequency is accomplished by use of a manual speed control located adjacent to the control cubicle. This control is a knob type device which permits rapid frequency adjustment, locking in any position, and vernier adjustment for finer control.

1-6. IDENTIFICATION AND TABULATED DATA.

a. Identification. There are eleven major identification and instruction plates on the generator set.

(1) Generator Set Identification Plate. Located at the top left side of the front housing assembly. Specifies nomenclature, model number, serial number, stock number, contract number, engine serial number, manufacturer, and shipping weight and dimensions.

(2) Generator Set Rating Plate. Located at top left side of front housing adjacent to generator set identification plate. Specifies kilowatt capacity relative to altitude and temperature, hertz rating, rated voltages and phases, voltage adjustment ranges, power factor, type, class, mode and size.

(3) Fuel System Diagram Plate. Located on inside face of left side generator compartment access door. Contains diagram of fuel system.

(4) Operating Instruction Plate. Located on inside face of right hand control panel access door. Specifies prestart checks, starting sequence, stopping sequence, and instructions for parallel operation.

(5) Schematic and Troubleshooting Diagram Plates. Troubleshooting plate is located on inside face of right and left engine compartment doors. A schematic diagram plate is located on the inside of the battery doors of the power generation and control circuits.

(6) Winterization System Diagram and Caution Plates (furnished with Winterization Kit). Installed on inside face of left rear upper control and lower left vent door. Specifies installation and operation of winterization systems. Also includes cautions pertinent to operation of winterization kits.

(7) Lifting and Tie-Down Attachment Information Plate. Located in the lower right rear generator compartment door. Specifies center of gravity, tie-down location, lifting shackle location and capacity and direction of travel.

(8) Battery Reconnection Instruction Plate. Located inside face of battery compartment access door. Contains diagram of battery installation and specifies cautions to be observed when replacing batteries.

(9) Generator Identification Plate. Located on upper right side of generator housing. Specifies nomenclature, part number, style, rated rpm, frequency serial number, kva rating, P/F, ampere rating, voltage, and manufacturer.

(10) Engine Identification Plate. Located on left side of engine block. Specifies manufacturer, manufacturer's specification, model number, serial number, date of manufacture, bore, stroke, displacement, maximum continuous speed, maximum set continuous brake horsepower, lube oil pressure, firing order, intake and exhaust valve tappet clearances, and military specification.

(11) Voltage Reconnection Plate. Located on terminal guard over voltage reconnection board. Contains instructions for reconnecting the generator from 120/208 to 240/416 volts and reconfiguration back to 120/208 volts.

b. Tabulated Data.

(1) Engine Generator Set (End Item):

Model Numbers:

50/60 Hz Tactical Utility	MEP-005A
50/60 Hz Tactical Precise	MEP-104A
400 Hz Tactical Precise	MEP-114A

DOD Drawing Numbers:

MEP-005A	70-005
MEP-104A	70-104
MEP-114A	70-114

Overall Dimensions and Weights:

Overall length (MEP-005A, MEP-104A, and MEP-114A)	80 inches
Overall width (MEP-005A, MEP-104A, and MEP-114A)	36 inches
Overall height (MEP-005A, MEP-104A, and MEP-114A)	55 inches

Dry Weights (less kits and optional equipment):

MEP-005A	2850 pounds
MEP-104A	2850 pounds
MEP-114A	3000 pounds

(2) Engine:

Manufacturer	White Engines, Inc. Hercules Engine Div.
Model	D-298-ERX37
DOD drawing number	72-2206
Type	6 cylinder, four cycle, liquid cooled diesel
Rated horsepower at 1500 RPM	50 continuous
Rated horsepower at 1800 RPM	57 continuous
Rated horsepower at 2000 RPM	64 continuous
Altitude degradation, 5000 to 8000 ft	3% per 1000 feet
Firing order	1,5,3,6,2,4
Winterization kit use	When temperature is -25°F or below

Valve tappet clearance adjustment:

Hot	0.015 Inch

(3) Cooling System:

Type	Pressurized radiator and centrifugal pump
Capacity	23.5 qts.

Normal operating temperature	170°F (76.7°C) to 200°F (93.3°C)

(3) Cooling System (Continued):

Temperature transmitter:

Voltage rating	24 Vdc

Resistance (ohms) at temperature °F (°C):

2360 ± 236	120 (48.9)
710 ± 35.5	200 (93.7)
310 ± 24.8	280 (133)

(4) Lubrication System:

Type system	Full flow, circulating pressure
Oil pump type	Positive displacement gear
Normal operating pressure	30-60 psig
Oil filter type	Full flow, replaceable element

Pressure transmitter:

Voltage rating	24 Vdc

Resistance (ohms) at pressure (psi):

15.0	30
30.0	60

Lubrication system capacity	8.0 quarts

(5) Hydraulic System (MEP 104A Only):

Hydraulic pump type	Positive displacement gear
Hydraulic filter type	Full flow, replaceable element
System capacity	1 gallon

(6) Fuel System:

Fuel tank capacity	26.0 gallons

Fuel transfer pumps:

Voltage rating	24 Vdc
Delivery pressure	7 psig (max)
Delivery rate	18 gallons per hr. (max)

Fuel level switch (day tank):

Type	Float
Current	3.0 amp at 6 to 32 Vdc
Pressure	0 to 150 psi

Over travel:

High	0.06 inch (min)
Low	0.12 inch (min)

Fuel injection nozzle holder cracking pressure	2500 - 2950 psig

(7) Engine Electrical System:

Batteries	Two 12 volt (MS35000-3) connected in series

Starter Assembly:

Manufacturer	Delco Remy, Inc.
Model	1113188

Rating:

Voltage	24 Vdc
Drive type	Positive indexing with over-run clutch

Battery charging alternator:

Manufacturer	Prestolite
Model	ANJ-7001
Rating	35 amp at 24 Vdc
Operating temperature range	-65°F to 175°F (-53.9°C to 79.4°C)
Current output	0 to 35 amperes at 1900 to 4000 rpm
Protective fuse	Buss, AGS, 40 amp

(8) Generator (50/60 Hz Tactical Utility and Tactical Precise).

Manufacturer	Electric-Machinery Mfg. Co.
DOD drawing number	72-2500
Type	Rotating field synchronous, brushless

Load capacity:

1500 rpm	25 kW at 50 Hz
1800 rpm	30 kW at 60 Hz

Current rating:

1500 rpm	86 amp at 120/208 Vac 43 amp at 240/416 Vac
1800 rpm	104 amp at 120/208 Vac 52 amp at 240/416 Vac

Power factor	0.8
Cooling	Impeller fan
Lubrication requirements	None
Drive type	Direct coupling
Duty classification	Continuous

(9) Generator (400 Hz Tactical Precise):

Manufacturer	Electric-Machinery Mfg. Co.
DOD drawing number	72-2550

(9) Generator (400 Hz Tactical Precise) (Cont):

Type	Rotating field synchronous, brushless
Load capacity (2000 rpm)	30 kw at 400 Hz
Current rating (2000 rpm)	104 amps at 120/208 Vac or 52 amps at 240/416 Vac
Power factor	0.8
Cooling	Impeller fan
Lubrication requirements	None
Drive type	Direct coupling
Duty classification	Continuous

(10) Electro-hydraulic Governing System:

Type system	Closed loop feedback
Load measuring unit:	
Manufacturer	Electromagnetic Industries, Inc.
Model No.	69-500
DOD drawing number	69-785
Governor control unit:	
Manufacturer	Electromagnetic Industries, Inc.
Model No.	
50/60 Hz	69-700
DOD drawing number	69-784
Hydraulic actuator unit:	
Manufacturer	Electromagnetic Industries, Inc.
Model No.	69-600-3
DOD drawing number	69-790

(11) Electric Governing System (MEP 114A):

Type system	Closed loop feedback
Load measuring unit:	
Manufacturer	Electromagnetic Industries, Inc.
Model No.	69-500
DOD drawing number	69-785
Governor control unit:	
Manufacturer	United Technologies
Model No.	CU 671C-7
DOD drawing number	81-4903
Electric actuator:	
Manufacturer	United Technologies
Model No.	AGB-130-D4
DOD drawing number	81-705

(12) Safety Devices:

(a) Low oil pressure switch:

Voltage rating	28 Vdc
Current rating	10 amps
Trip pressure	17 ± 3 psig

(b) Coolant high temperature switch:

Voltage rating	28 Vdc
Current rating	10 amps
Trip temperature	220°F + 3°F (104.8°C ± 1.5°C)

(c) Speed switch:

Type	Centrifugal, manual reset
Overspeed trip	120 to 122.5 percent continuous engine speed (2400 to 2450 rpm, engine speed is 1200 to 1225 rpm, switch speed).
Element trip and reset	S9-1. Trip - 290-310 rpm Reset - 190-310 rpm

S9-2. Trip - 590-610 rpm (50/60 Hz) 825-850 rpm (400 Hz)
Reset - 490-510 rpm (50/60 Hz) 725-750 rpm (400 Hz)

S9-3. Trip - 1200-1250 rpm
Reset - Manual

(13) Nut and Bolt Torque Data:

Intake manifold mounting nuts	35 lb-ft
Exhaust manifold mounting nuts	35 lb-ft

Low oil pressure switch	20 lb-ft
Oil filter	27 ± 2 lb-ft
Oil pressure transmitter	20 lb-ft
Fuel injector mounting screws	30-40 lb-ft
Fuel filter	17 ± 2 lb-ft
Overtemperature switch	12-15 lb-ft
Coolant temperature transmitter	12-15 lb-ft

(14) Optional Equipment.

(a) Fuel burning winterization kit:

DOD drawing number	72-2837
Operating temperature	-25°F (-31.7°C) to -65°F (-53.9°C)
Operating voltage	24 Vdc
Operating current:	
Starting	17.5 amperes
Running	7.5 amperes
Fuel consumption	20 to 23 cc/min.
Duty cycle	Continuous

(b) Electric winterization kit:

DOD drawing number	72-2836
Operating voltage	208 to 240 volts, 50/60 or 400 Hz single phase
Operating current	14.6 to 12.5 amperes
Operating temperature	130°F (54.4°C) to 155°F (67.4°C)

(c) Wheel mounting kit:

DOD drawing number	72-2833
Capacity (maximum)	3500 lbs.
Towing speed (maximum)	5 MPH

(d) Load bank kit:

DOD drawing number	72-2866
Load rating	15 KW
Operating voltage	120/208 or 240/416 Vac 3 phase, 4 wire

(15) Fuel System Diagram. Refer to figure 1-3.

(16) Hydraulic System Diagram. Refer to figure 1-4.

(17) AC and DC, 15 and 30 KW, 50/60 and 400 Hz, Precise and Utility, Wiring Diagram, Dwg. No. 72-2205. Refer to figure FO-1.

(18) AC Schematic Diagram, 15 and 30 KW, Precise Generator Sets, Dwg. No. 72-2200 for MEP 104A and 84-805 for 114A. Refer to figure FO-2.

(19) DC Schematic Diagram, 15 and 30 KW, Precise Generator Sets, Dwg. No. 72-2269 for MEP 104A and 84-804 for 114A. Refer to figure FO-3.

(20) AC Schematic Diagram, 15 and 30 KW, Utility Generator Sets, Dwg. No. 72-2295. Refer to figure FO-4.

(21) DC Schematic Diagram, 15 and 30 KW, Utility Generator Sets, Dwg. No. 72-2277. Refer to figure FO-5.

(22) Shipping Dimensions and Weights. Refer to figure 1-2.

1-7. DIFFERENCES BETWEEN MODELS.

The primary differences between the models of the generator sets covered in this manual are as follows:

a. Models MEP 005A and MEP 104A are equipped with a 50/60 Hz generator. Model MEP 114A is equipped with a 400 Hz generator.

b. Model MEP 104A uses an electro-hydraulic governor. Model MEP 114A uses an electric governor system. Model MEP 005A uses a mechanical governor which is integral with the fuel injection pump.

c. The control cubicle of all three models have a frequency adjust rheostat, but it is functional only on models MEP 104A and MEP 114A. Model MEP 005A accomplishes frequency adjustment through the manual speed control.

d. All three models use the same special relay box, but models MEP 104A and MEP 114A are also equipped with a precise relay box. The two precise relay boxes are identical with the exception that the precise relay box of model MEP 104A contains a frequency selector switch whereas the precise relay box of model MEP 114A does not.

e. Models MEP 104A and MEP 005A use the same exciter regulator assembly and cross current transformer. These components are different on model MEP 114A.

f. Differences in performance characteristics are given in table 1-1.

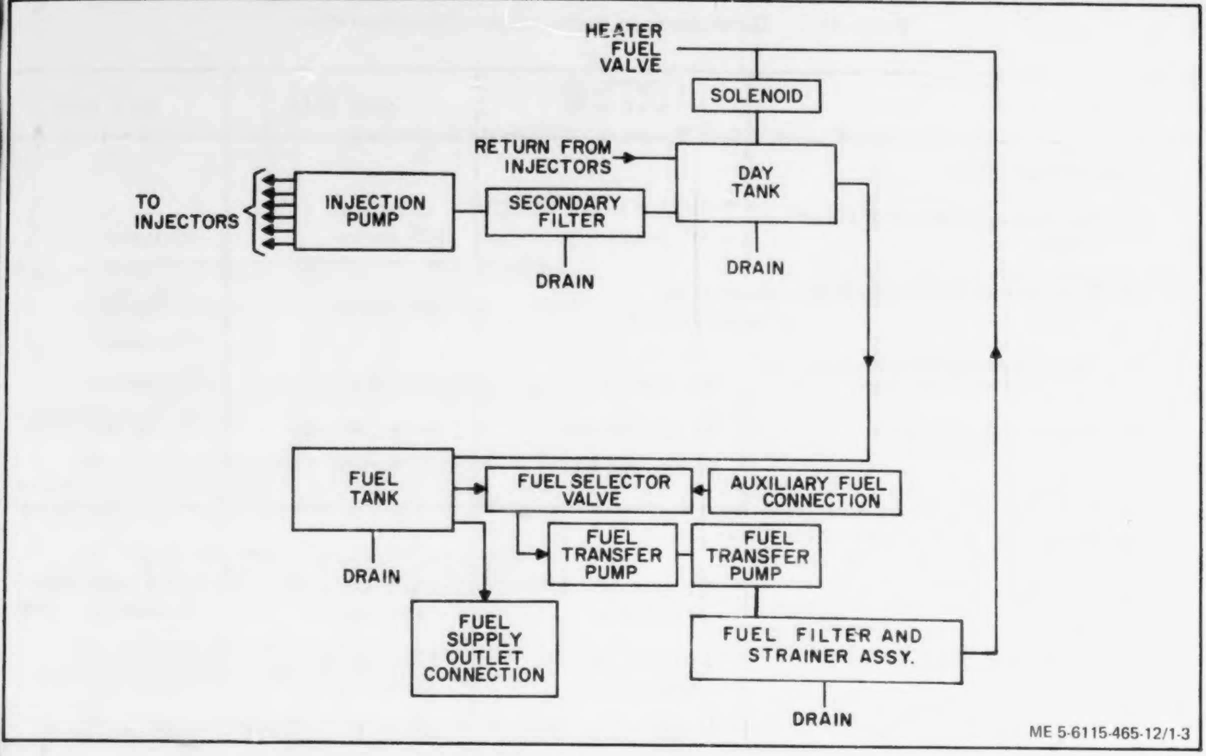

HEATER FUEL VALVE
SOLENOID
RETURN FROM INJECTORS
DAY TANK
TO INJECTORS
INJECTION PUMP
SECONDARY FILTER
DRAIN
DRAIN
FUEL TANK
FUEL SELECTOR VALVE
AUXILIARY FUEL CONNECTION
FUEL TRANSFER PUMP
FUEL TRANSFER PUMP
DRAIN
FUEL SUPPLY OUTLET CONNECTION
FUEL FILTER AND STRAINER ASSY.
DRAIN
ME 5-6115-465-12/1-3

Figure 1-3. Fuel System Diagram

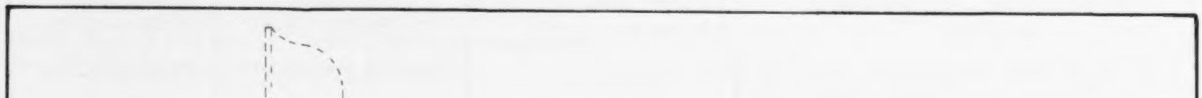

ENGINE ASSEMBLY
HYDRAULIC PUMP
SUMP
HYDRAULIC ACTUATOR UNIT
FILTER
ME 5-6115-465-12/1.4

Figure 1-4. Hydraulic System Diagram

Table 1-1. Differences in Performance Characteristics

	MEP 005A	MEP 104A	MEP 114A
1. Voltage regulation:			
(a) Dip with application of rated load.	20% (max)	15% (max)	12% (max)
(b) Rise with rejection of rated load.	20% (max)	15% (max)	12% (max)
(c) Dip with application of simulated motor load.	40% (max)	30% (max)	25% (max)
(d) Adjustment range Vac	50 Hz: 380-426 60 Hz: 395-480	50 Hz: 380-426 60 Hz: 395-480	400 Hz: 395-458
2. Frequency:			
(a) Regulation	2.0 to 3.0% of rated frequency	0.25% of rated frequency	0.25% of rated frequency
(b) Short term steady state stability	Within 2.0% bandwidth	Within 0.5% bandwidth	Within 0.5% bandwidth
(c) Long term steady state stability	Within 3% bandwidth	Within 1% bandwidth	Within 1% bandwidth
(d) Undershoot with application of rated load	4% of rated frequency (max)	1.5% of rated frequency (max)	1.5% of rated frequency (max)
(e) Recovery time after application of rated load	3 seconds (max)	1 second (max)	1 second (max)
(f) Overshoot with rejection of rated load	3% of rated frequency (max)	1.5% of rated frequency (max)	1.5% of rated frequency (max)
(g) Recovery time after rejection of rated load.	3 second (max)	1 second (max)	1 second (max)
(h) Drift (60°F temperature change)	1% rated frequency (max)	0.5% rated frequency (max)	0.5% rated frequency (max)
(i) Approximate adjustment range)	58 to 62 Hz for 60 Hz operation (48 to 52 Hz) for 50 Hz operation	58 to 62 Hz for 60 Hz operation (48 to 52 Hz) for 50 Hz operation	390 to 410 Hz

CHAPTER 2

INSTALLATION AND OPERATION INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF MATERIAL

2-1. INSPECTING AND SERVICING THE GENERATOR SET.

a. Inspection.

(1) Check the generator set rating plate for positive identification.

(2) Make a complete visual inspection of the exterior of the generator set for evidence of damage which may have occurred during shipment.

(3) Open the battery compartment access doors (figure 1-1) and inspect the batteries for damage.

(4) Open the control panel access doors (figure 1-2) and check the control panel for damage.

(5) Open the generator air intake doors (figure 1-2) and inspect the generator vent grill for damage.

(6) Open the generator compartment access doors (figures 1-1 and 1-2) and check each component for obvious signs of damage and corrosion.

(7) Open the engine compartment access doors (figures 1-1 and 1-2) and check the engine and its components for visible damage.

(8) Check the engine air cleaner assembly and exhaust opening for obstruction.

(9) Check the v-belts for proper adjustment (paragraph 3-90).

(10) Make a thorough visual inspection of the generator set for loose or missing mounting hardware or damaged or missing parts.

(11) Check all fuel and hydraulic hoses for loose connections. Tighten any loose connections.

(12) Check all wiring harnesses for loose connectors and terminals. Tighten any found loose.

b. Servicing.

(1) Batteries.

(a) Open battery compartment access doors (figure 1-1).

(b) Remove battery tray retaining screws and lockwashers and slide battery tray out of battery compartment.

(c) Remove battery vent caps.

WARNING

Battery electrolyte contains sulfuric acid which can cause severe burns. Always dilute electrolyte with water. Never pour electrolyte into water as high temperatures will be generated and splattering of the electrolyte may result. If electrolyte comes in contact with skin or clothing, rinse immediately with clean water.

(d) Fill the battery cells to the slots in the filler wells with electrolyte and install the vent caps. Make sure that the vent holes in the caps are open.

NOTE

Batteries are shipped dry charged. Electrolyte must be requisitioned separately.

(e) Refer to paragraph 3-65 and connect battery cables.

(f) Apply an approved corrosion preventive compound to battery post and cable terminals.

(g) Slide battery tray into battery compartment and secure with retaining screws and lockwashers.

NOTE

If generator set is not to be operated within 12 hours, batteries must be charged.

(h) Close the battery compartment access doors.

(i) After 30 minutes, check electrolyte level. Add electrolyte as required.

(2) Cooling System.

(a) Open the radiator filler cap access door (figure 1-1) and remove the radiator cap.

Table 2-1. Freezing Points, Composition and Specific Gravities of Military Anti-freeze Materials

Lowest expected ambient temp. °F	Pints of inhibited glycol per gal. of coolant [1]	Compound, antifreeze Arctic [2]	Ethylene glycol coolant solution specific gravity at 68°F [3]
+20	1-1/2	Issued full strength and ready mixed for 0° to -65°F temperatures for both initial installation and replenishment of losses.	1.022
+10	2		1.036
0	2-3/4		1.047
-10	3-1/4		1.055
-20	3-1/2		1.062
-30	4		1.067
-40	4-1/4		1.073
-50	Arctic anti-freeze preferred	DO NOT DILUTE WITH WATER OR ANY OTHER SUBSTANCE.	
-60			
-75			

[1] Maximum protection is obtained at 60 percent by volume (4.8 pints of ethylene glycol per gallon of solution.

[2] Military Specification MIL-C-11755 Arctic type, nonvolatile anti-freeze compound is intended for use in the cooling system of liquid-cooled internal combustion engines. It is used for protection against freezing primarily in Arctic regions where the ambient temperature remains for extended periods close to -40°F or drops below, to as low as -90°F.

[3] Use an accurate hydrometer. To test hydrometer, use 1 part ethylene glycol anti-freeze to 2 parts water. This should produce a hydrometer reading of 0°F.

(b) Fill the cooling system with coolant as specified in table 2-1 and replace cap.

(3) Fuel System.

(a) Check to see that the fuel tank drain valve (84, figure 3-22) is closed and the cap is installed.

(b) Remove the fuel tank filler cap.

WARNING

When filling the fuel tank, maintain metal-to-metal contact between the fuel tank filler neck and the fuel nozzle to prevent sparks from static electricity. There shall be no smoking or open flames in the vicinity of the fueling operation.

CAUTION

JP-4 fuel is considered an emergency fuel only.

(c) Fill the fuel tank with fuel.

(d) Install the fuel tank filler cap.

(4) Lubrication System.

(a) Check to see that the drain plug is installed in the engine crankcase drain tube and close valve. (See Lubrication Order.)

(b) Fill the crankcase to the proper level with oil. (See paragraph 3-3 for lubrication information.)

(5) Remove cap from hydraulic sump and fill sump to proper level on dipstick with oil conforming to Military Specification MIL-H-5606 (for MEP 104A only).

(6) Preventive Maintenance. Perform the before operation preventive maintenance checks and services. Refer to table 3-1.

2-2. INSTALLATION OF SEPARATELY PACKED COMPONENTS.

There are no separately packed components.

2-3. INSTALLATION INSTRUCTIONS.

a. General. The generator set is designed to operate satisfactorily up to 15 degrees out of level; however, the unit should be as level as possible during operation. The generator set installation site should provide adequate ventilation to prevent cooling air from recirculating. The site must be within 25 feet of any generator set to be connected in parallel and within 25 feet from any auxiliary fuel supply. The generator set control cubicle may be removed as a unit and installed up to 500 feet from the remainder of the set. A wiring harness with 40 AWG #16 and 7 AWG #12 conductors installed between connectors P1 and P2 (figures FO-1 and FO-2) allows the generator set to be started, operated, and monitored from the remotely installed control cubicle. Refer control cubicle removal and installation to higher level maintenance. Refer to figure 2-1 for dimensions, clearances, air flow requirements and floor capacity requirements when selecting an installation site.

b. Outdoor Installation. Select the site to make maximum use of natural protective barriers while allowing enough space on all sides for service and maintenance. The soil of the site should be firm and well drained. In areas where the soil will not support the generator set, use planks or other suitable material as dunnage.

c. Indoor Installation.

WARNING

Do not operate the generator set in an enclosed area unless the exhaust fumes are piped outside the enclosure. Inhalation of exhaust gases will result in serious illness or death.

Position the generator set so that a maximum supply of cooling air is available. Never situate the generator set with the radiator near a wall or other object which would impede the free circulation of cooling air. If a free supply of cooling air is not available, provide vents or ducting to the outside of the installation. Insure that the cooling air intake and outlet openings in the installation are at least as large as the cooling air intake and exhaust openings on the generator set. If louvers are used, increase the size of the openings by 35 percent. Install a gas tight metal pipe from the exhaust outlet on the generator set to the outside of the installation. Use as short a pipe as possible with no more than one 90 degree bend and as few lesser bends as possible. Insure that the inside diameter of the exhaust piping is as large or larger than the inside diameter of the exhaust connection on the generator set. The termination of the exhaust pipe shall be such that the hot gases or sparks will be discharged harmlessly and will not be directed against combustible material or into an area containing flammable gases or vapors. Provide an adequate fire-proof shield at the point where the exhaust piping passes through a flammable wall. If the exhaust piping is so positioned that the danger of personnel touching it exists, wrap it with asbestos. Refer to figure 2-1 for dimensions, air flow requirements, and floor loading capacity.

d. Grounding. The generator set may be grounded to an underground metallic water system, a driven metal rod or a buried metal plate. A ground rod must have a minimum diameter of 5/8 inch if solid or 3/4 inch if pipe and must be driven to a minimum depth of 8 feet. A ground plate must have a minimum area of 9 square feet and be buried to a minimum depth of 4 feet. The ground lead must be at least No. 6 AWG copper wire. If ground rod is used, refer to figure 2-2 and connect the generator set to the ground as follows.

WARNING

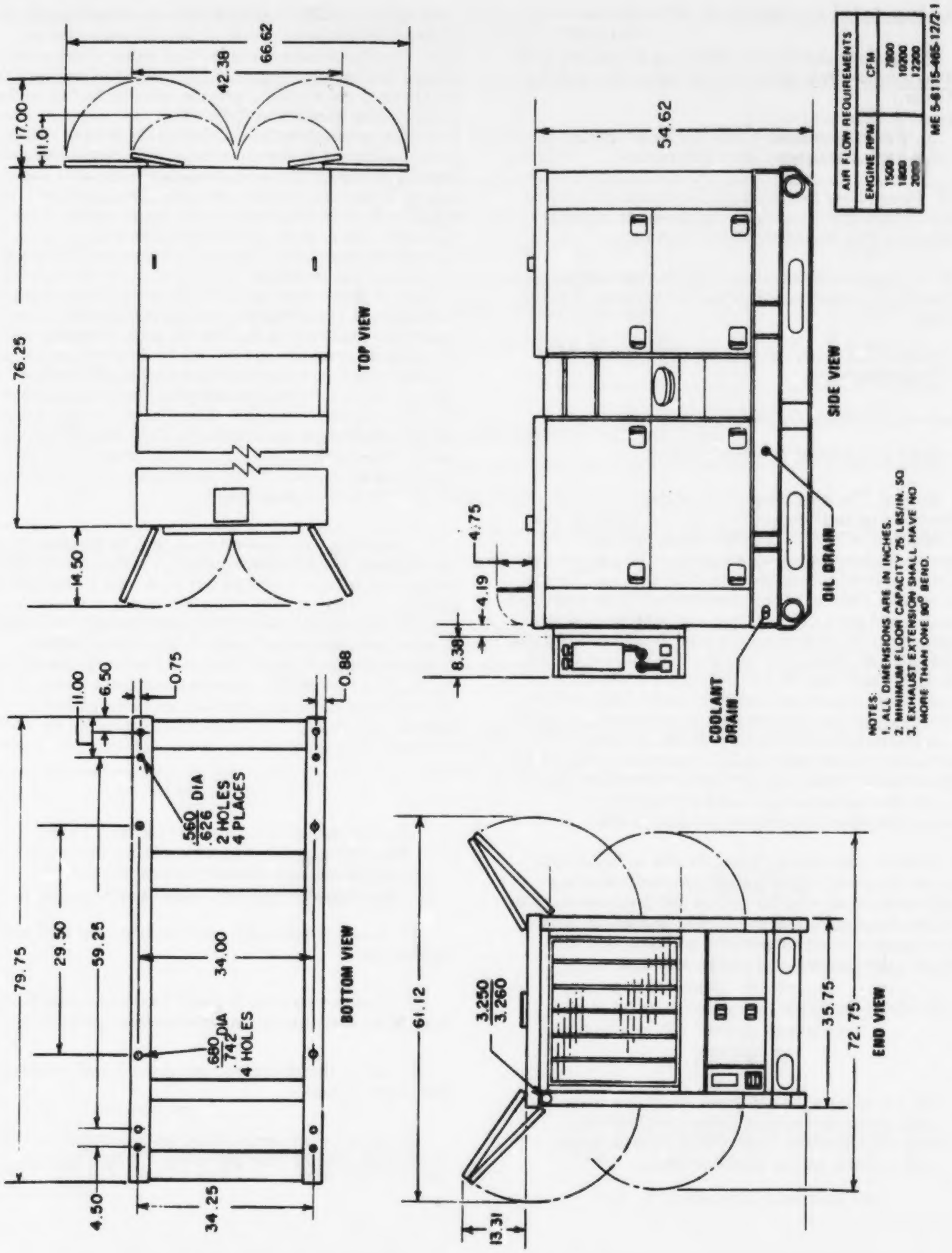
Do not operate the generator set until it has been connected to a suitable ground. Serious injury or death by electrocution can result from operating an ungrounded generator set.

(1) Insert ground cable into slot in ground stud and tighten nut.

(2) Connect coupling to ground rod and install driving stud. Make sure that driving stud seats on ground rod.

(3) Drive the ground rod into ground until coupling is just above surface.

(4) Remove driving stud and install another section of ground rod, making sure that it seats on first section.


66.62
42.38
17.00
11.0
76.25
14.50
TOP VIEW
54.62
4.75
4.19
8.38
OIL DRAIN
COOLANT DRAIN
SIDE VIEW
11.00
6.50
0.75
0.88
.560/.626 DIA 2 HOLES 4 PLACES
79.75
29.50
59.25
34.00
.680/.742 DIA 4 HOLES
4.50
34.25
BOTTOM VIEW
61.12
3.250/3.260
13.31
35.75
72.75
END VIEW
ME 5-6115-465-12/2-1

AIR FLOW REQUIREMENTS	
ENGINE RPM	CFM
1500	7800
1800	10200
2000	12200

NOTES:
1. ALL DIMENSIONS ARE IN INCHES.
2. MINIMUM FLOOR CAPACITY 75 LBS/IN. SQ
3. EXHAUST EXTENSION SHALL HAVE NO MORE THAN ONE 90° BEND.

Figure 2-1. Installation Plan

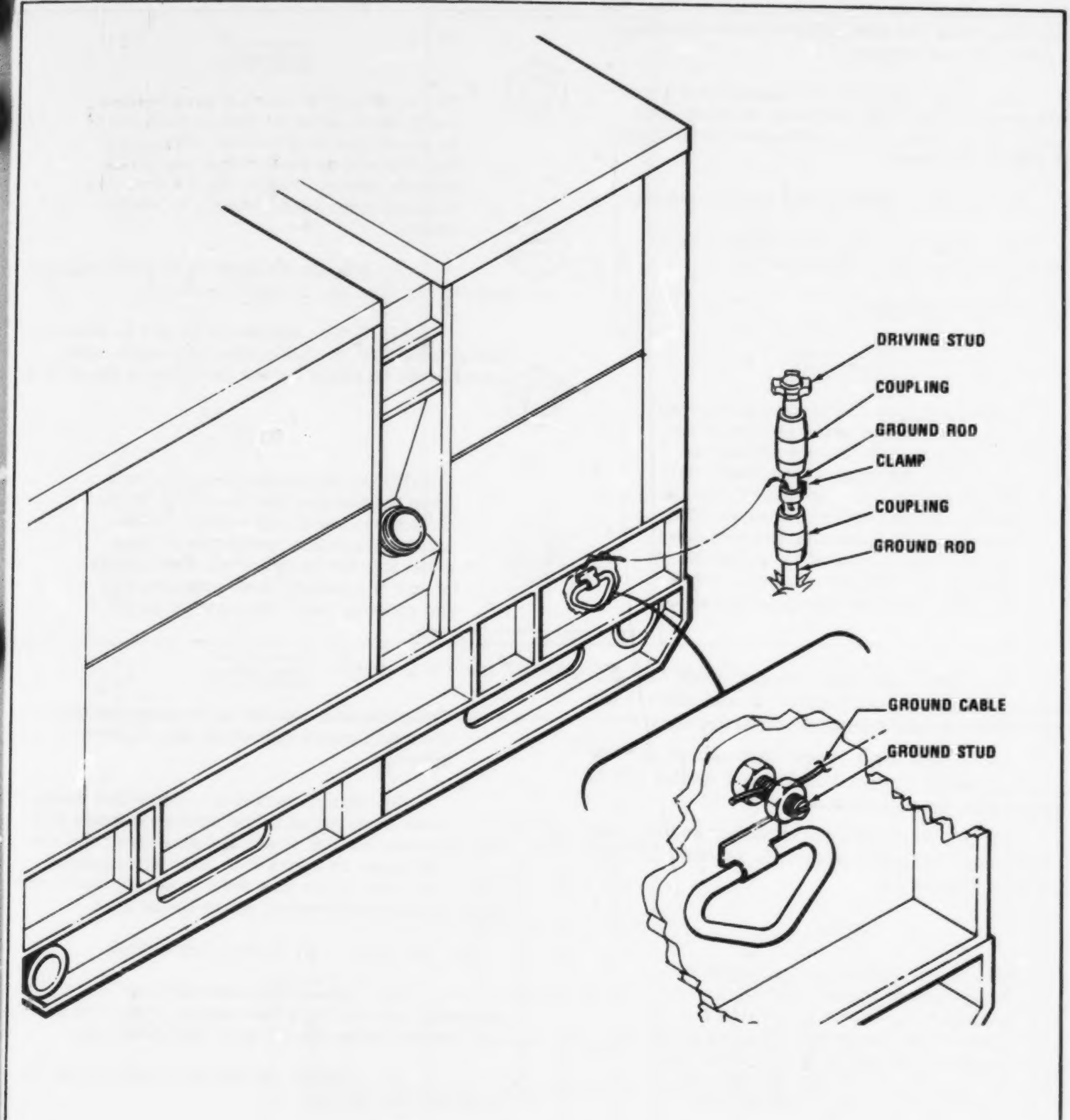

DRIVING STUD
COUPLING
GROUND ROD
CLAMP
COUPLING
GROUND ROD
GROUND CABLE
GROUND STUD
ME 5-6115-465-12/2-2

Figure 2-2. Ground Connections

(5) Install another coupling and driving stud. Drive the ground rod down until the new coupling is just above ground surface.

(6) Use a minimum of 3 sections of 3 foot length ground rods. Add additional sections until ground rod has been driven sufficiently deep to provide effective ground.

(7) Remove driving stud and top coupling.

(8) Connect clamp and ground cable to ground rod and securely tighten screw.

e. Load Connection.

WARNING

Lethal voltages are present at the load connection board of the generator set during operation. Do not attempt to connect or disconnect load leads while the generator set is operating. Do not attempt to connect or disconnect load leads with the generator set shut down and the load connected to another power source, or while the generator set is parallel to another which is operating.

(1) Open the left access door to the generator compartment (figure 1-2) and remove the safety from the load terminal bound (figure 1-2).

(2) Insert load leads through plate and sleeve assembly (figure 1-2) located to the left of the generator set air intake.

(3) A 208 or 416 Vac three phase load may be connected between terminals marked L1, L2, L3, and L0 (figure 2-3).

NOTE

The load terminals will accommodate 2-wire single phase and 4-wire, 3 phase loads. One or more single phase loads can be served alone or in combinations with 3 phase loads; but the load on any one phase must not exceed 100 percent of the current rating of that phase.

(4) Phase rotation for three phase loads is L1, L2, L3.

NOTE

After load connections tighten terminal binding nuts with plastic/phenolic box end wrench and install safety cover, refer to paragraph 2-4 and check that the reconnection board is set for proper voltage.

f. Connection for Parallel Operation.

WARNING

Do not attempt to connect paralleling leads while either or both of the units to be paralleled is operating. Make sure that there is no input to the load from another source. Failure to observe this warning may result in death by electrocution.

(1) Identify the units to be paralleled as Unit No. 1, Unit No. 2, and Unit No. 3.

(2) If the generator sets are to share a load greater than the KW rating of a single unit, connect load terminal boards as shown in figure 2-4.

NOTE

Paralleling of precise generator sets requires that paralleling cables be installed and the shorting plug in the lower paralleling receptacle of each generator set be removed. Paralleling of utility generator sets requires that the shorting plugs be installed on all sets.

WARNING

The generator sets must be connected to the load through individual circuit interupters.

(3) Situations which require that continuous power be supplied to the load necessitate that load terminal boards of parallel generators be connected as shown in figure 2-5. This arrangement allows transfer of the load from generator set to the other without interrupting power to the load.

g. Auxiliary Fuel Source Connection.

(1) Connect the auxiliary fuel line to the generator set auxiliary fuel supply connection (figure 1-2) located below the integral tank filler cap.

(2) Connect the auxiliary fuel line to the auxiliary fuel source.

(3) Position the fuel selector valve (figure 1-2) in the AUXILIARY position.

2-4. GENERATOR SET CONVERSION INSTRUCTIONS.

a. To convert the generator set for operation at 120/208 Vac or 240/416 Vac, proceed as follows.

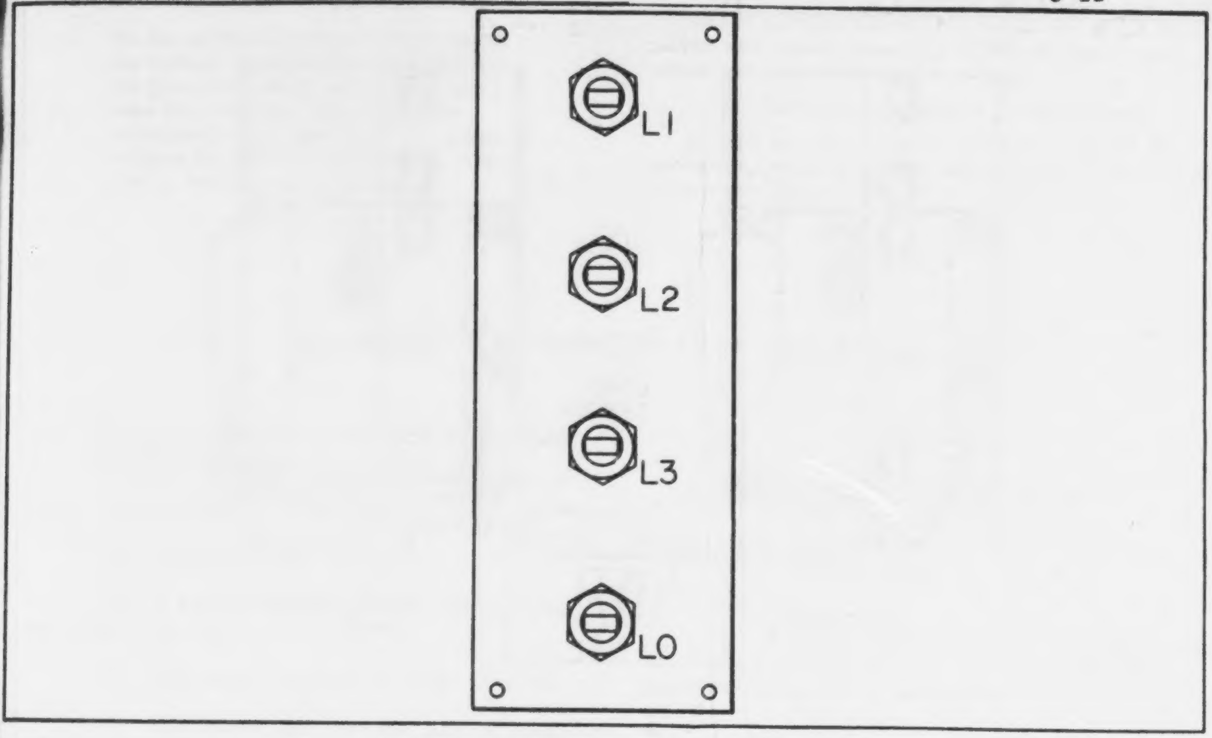
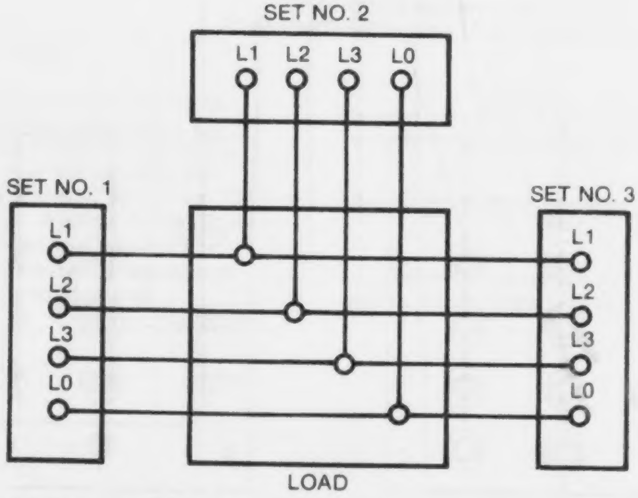


Figure 2-3. Load Terminal Board Assembly


SET NO. 2
L1
L2
L3
L0
SET NO. 1
L1
L2
L3
L0
SET NO. 3
L1
L2
L3
L0
LOAD

NOTE: Connect L1 to L1, L2 to L2, etc.

Figure 2-4. Parallel Connection

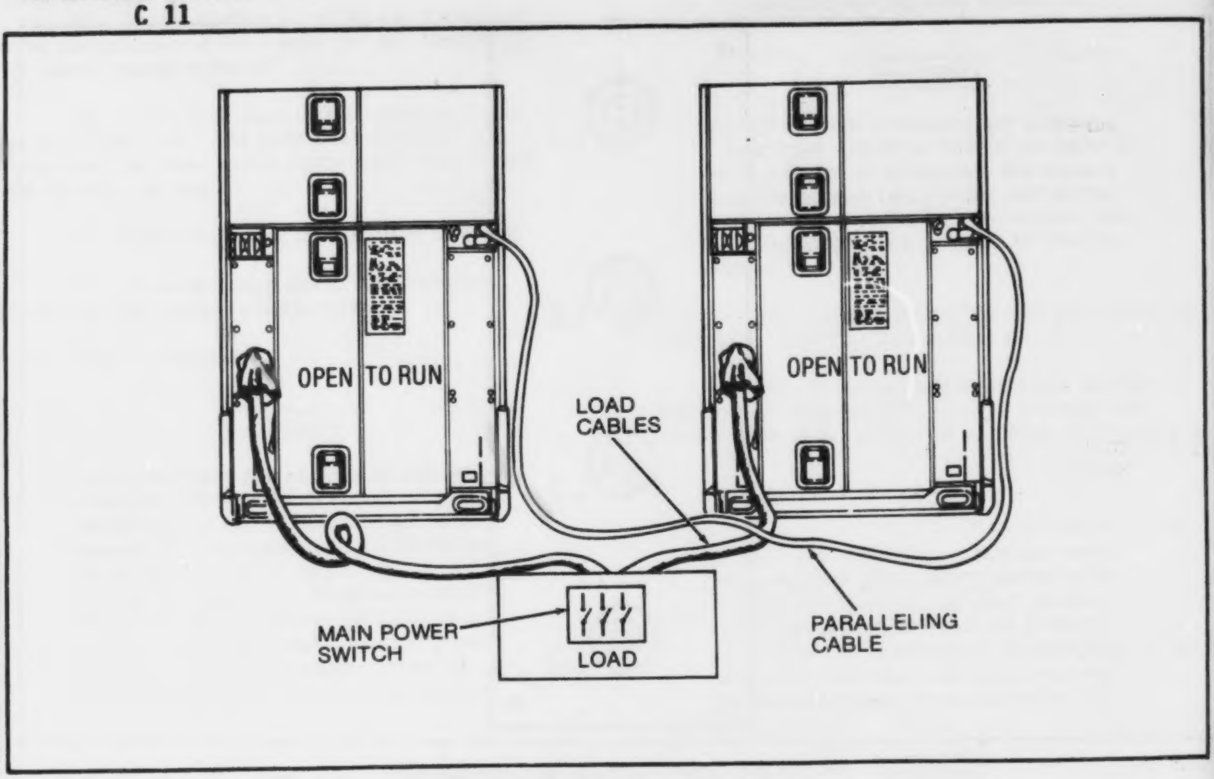
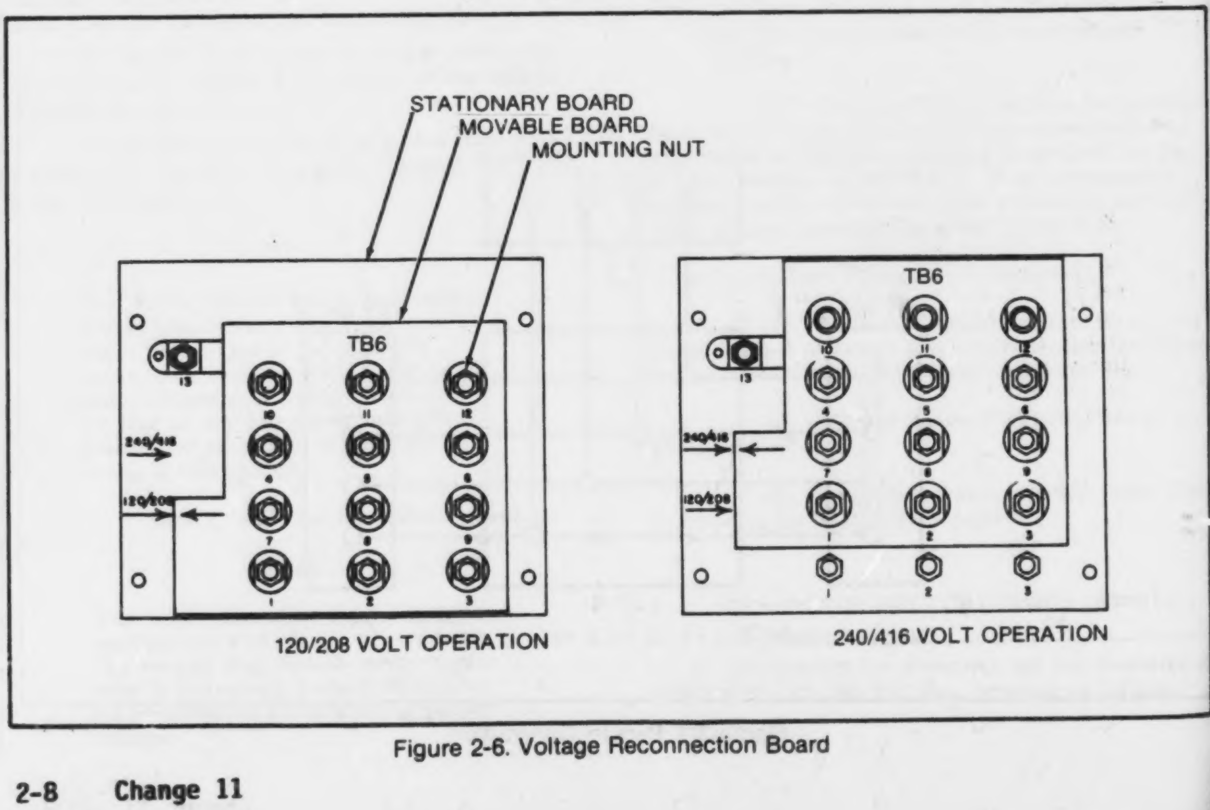

OPEN TO RUN
OPEN TO RUN
LOAD CABLES
MAIN POWER SWITCH
LOAD
PARALLELING CABLE

Figure 2-5. Parallel Connection


STATIONARY BOARD
MOVABLE BOARD
MOUNTING NUT
TB6
13
10
11
12
4
5
6
7
8
9
1
2
3
240/416
120/208
TB6
13
10
11
12
4
5
6
7
8
9
1
2
3
1
2
3
240/416
120/208

120/208 VOLT OPERATION

240/416 VOLT OPERATION

Figure 2-6. Voltage Reconnection Board

WARNING

Do not attempt to alter the position of the voltage reconnection board while the generator set is operating. Make sure that the generator set is not paralleled to another which is operating. Failure to observe this warning may result in death by electrocution.

(1) Remove 12 mounting nuts (figure 2-6) and locate the movable board until the arrow at its edge mates with the arrow on the stationary board indicating the desired operation voltage.

(2) Install and tighten the mounting nuts.

b. To convert 50/60 Hz precise set to 50 Hz operation, place frequency select switch (figure 1-1) on precise relay assembly to 50 Hz position.

Section II. MOVEMENT TO A NEW WORK SITE

2-5. DISMANTLING THE GENERATOR SET FOR MOVEMENT.

a. Preparation for Movement.

(1) Disconnect the load leads.

(2) If exhaust extension was used, remove and install rain cap.

(3) Disconnect paralleling leads, if used.

(4) Disconnect auxiliary fuel line, if used, and store on unit.

(5) Disconnect ground lead, remove ground rods and store on unit.

(6) Secure all doors and panels.

b. Movement.

WARNING

Do not use hoisting equipment or transporting vehicle with capacity less than 3200 pounds. Do not allow the generator set to swing when it is suspended. Securely attach the generator set to the transporting vehicle. Failure to observe this warning may result in serious injury or death of personnel or damage or destruction of the generator set.

CAUTION

To avoid undue side pressures which could result in damage to the lifting frame, use a minimum bridle of 5 feet on the hoisting sling.

(1) Hoisting. Attach a sling to the generator set lifting clevises (figure 1-1) for loading with a crane or movement by helicopter.

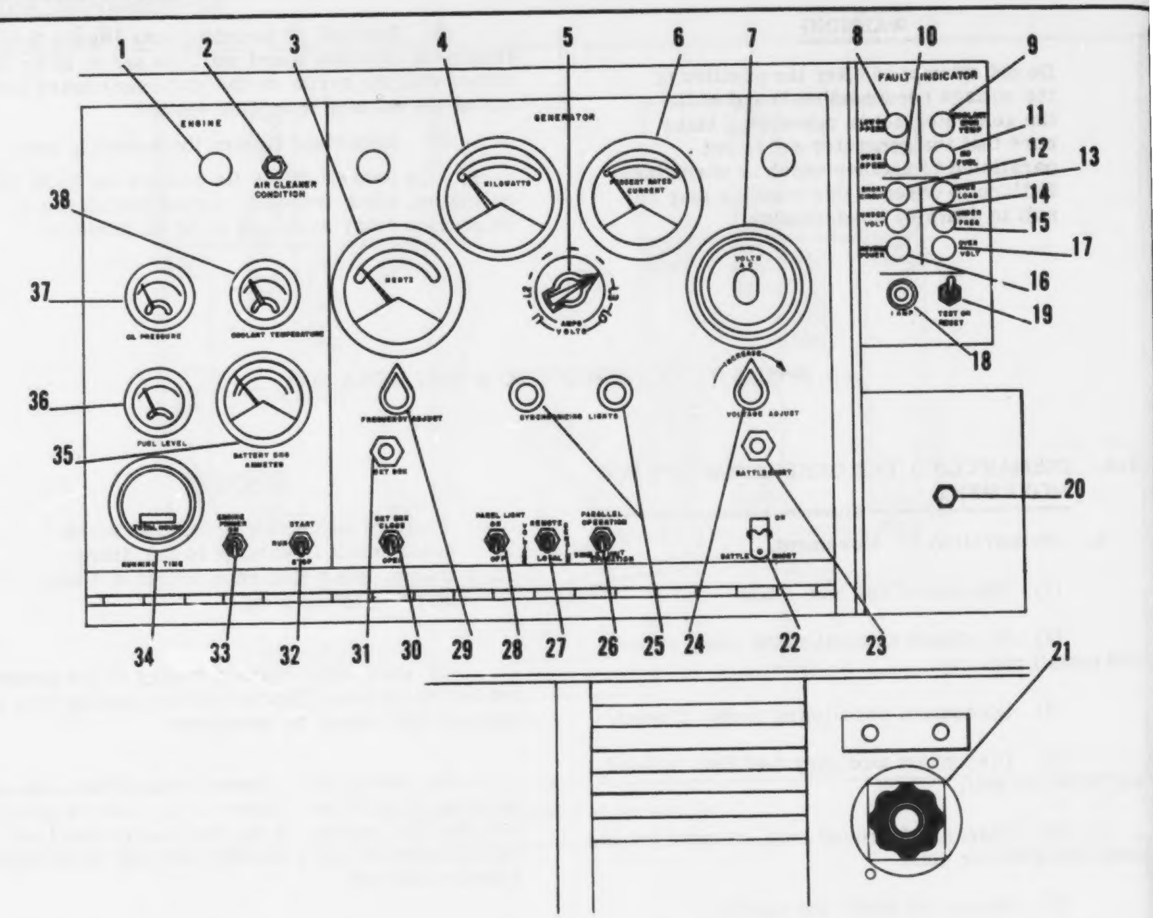
(2) Fork Lift. Insert forks of fork lift into openings of skid base (figure 1-1). Lift the generator set onto the carrier. If the distance is short and the terrain permits the generator set may be transported with the fork lift.

(3) Skidding. Attach a sling through the pipes provided in the skid base and connect to a suitable vehicle for skidding to the desired location.

(4) Shipment. Movement over greater distances requires that the generator be prepared for shipment in accordance with paragraph 1-4.

2-6. REINSTALLATION AFTER MOVEMENT.

Refer to paragraph 2-3 and install the generator set in accordance with the instructions provided.


1
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20
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24
22
23
ENGINE
AIR CLEANER CONDITION
GENERATOR
FAULT INDICATOR
KILOWATTS
PERCENT RATED CURRENT
HERTZ
OIL PRESSURE
COOLANT TEMPERATURE
FUEL LEVEL
BATTERY CHG AMMETER
FREQUENCY ADJUST
SYNCHRONIZING LIGHTS
VOLTAGE ADJUST
AMPS VOLTS
START
RUN
STOP
ENGINE PRIMER
RUNNING TIME
PANEL LIGHT
ON
OFF
REMOTE
LOCAL
PARALLEL OPERATION
BATTLE SHORT

1. Panel illumination light
2. Air cleaner condition indicator
3. Frequency meter
4. Kilowatt meter
5. Volts-amps transfer switch
6. AC ammeter
7. AC voltmeter
8. Low oil pressure indicator
9. Coolant high temperature indicator
10. Overspeed indicator
11. No fuel indicator
12. Short circuit indicator
13. Overload indicator
14. Under voltage indicator
15. Under frequency indicator
16. Reverse power indicator
17. Over voltage indicator
18. Fault location indicator fuse
19. Test or reset switch
20. DC circuit breaker
21. Manual speed control
22. Battle short switch
23. Battle short indicator
24. Voltage adjust rheostat
25. Synchronizing lights
26. Operations switch
27. Voltage sensing switch
28. Panel light switch
29. Frequency adjust rheostat
30. Circuit breaker switch
31. Circuit breaker indicator
32. Start-run-stop switch
33. Engine primer switch
34. Running time meter
35. Battery charge ammeter
36. Fuel level gauge
37. Oil pressure gauge
38. Coolant temperature gauge

ME 5-6115-465-12/2-7

Figure 2-7. Generator Set Controls and Instruments

Section III. CONTROLS AND INSTRUMENTS

2-7. GENERAL.

This section describes and illustrates the various controls and instruments and provides the operator with sufficient information to insure proper operation of the generator set.

2-8. CONTROLS AND INSTRUMENTS.

a. General. The generator set controls and instruments are illustrated in figure 2-7.

b. Panel Illumination Light (1, figure 2-7). The panel illumination lights are 30 volt, 0.6 amp, candelabra bayonet base incandescent lamps with a clear finish. Each lamp is fitted with a hood which is slotted on the bottom to direct light onto the control panel. The panel illumination lights are controlled by the PANEL LIGHTS switch.

c. Air Cleaner Condition Indicator (2, figure 2-7). The air cleaner condition indicator is a press-to-test lamp with a red lens. It illuminates to indicate that the engine air cleaner is clogged.

d. Frequency Meter (3, figure 2-7). The frequency meter is a dial indicator type gauge. For the 50/60 Hz tactical precise and tactical utility, the meter is calibrated from 48 to 62 Hertz in 0.1 Hertz increments with the region between 53 and 57 Hertz unmarked. For the 400 Hz tactical precise model, the meter is calibrated in 0.5 Hertz increments from 388 to 412. The frequency meter indicates the frequency of the generator set output. Normal indication is 400 Hz for Mode II generator sets. For Mode I generator sets, normal indication is determined by the manual speed control adjustment (50 or 60 Hz).

e. Kilowatt Meter (4, figure 2-7). The kilowatt meter is a dial indicator type gauge calibrated in percent of rated output from 0 to 133. It indicates the generator set power output. Normal indication depends on applied load.

f. Volts-Amps Transfer Switch (5, figure 2-7). The VOLTS-AMPS transfer switch is a rotary type switch. It selects current in each phase, three line-to-line voltages, and three line-to-neutral voltages which are indicated on the ammeter and voltmeter.

g. AC Ammeter (6, figure 2-7). The ac ammeter is a dial indicator type gauge. For the 50/60 Hz tactical precise and tactical utility models, it is calibrated in percentage or rated current from 0 to 133 for 60 Hz operation and from 0 to 160 for 50 Hz operation. For the 400 Hz tactical precise model, it is calibrated in percentage of rated current from 0 to 133. Normal indication depends upon applied load.

h. AC Voltmeter (7, figure 2-7). The ac voltmeter is a dial indicator type gauge calibrated in 5 volt increments from 0 to 500. It indicates the voltage output of the generator set. Normal indication is 120, 208, 240 or 416, depending upon the position of the reconnection board and the volts-amps transfer switch.

i. Low Oil Pressure Indicator (8, figure 2-7). The low oil pressure indicator is an indicator lamp with a red lens. It illuminates when the oil pressure drops below 20 ± 2 psi and the low oil pressure protective device actuates.

j. Coolant High Temperature Indicator (9, figure 2-7). The coolant high temperature indicator is an indicator lamp with a red lens. It illuminates when the coolant temperature rises above 217 ± 3°F and the high coolant temperature protective device actuates.

k. Overspeed Indicator (10, figure 2-7). The overspeed indicator is an indicator lamp which has a red lens. It illuminates when the engine speed reaches 2400 to 2450 rpm and the overspeed protective device actuates.

l. No Fuel Indicator (11, figure 2-7). The no fuel indicator is an indicator lamp with a red lens. It illuminates when the day tank contains only enough fuel for one minute of operation and the low fuel protective device actuates.

m. Short Circuit Indicator (12, figure 2-7). The short circuit indicator is an indicator lamp with a red lens. It illuminates with the actuation of the short circuits protective device.

n. Overload Indicator (13, figure 2-7). The overload indicator is an indicator lamp with a red lens. It illuminates when the load on any phase reaches 130% of rated load and the overload protective device actuates.

o. Under Voltage Indicator (14, figure 2-7). The under voltage indicator is an indicator lamp with a red lens. It illuminates instantaneously when voltage drops below 48 volts or 6 ± 2 seconds after voltage drops to 99 ± 4 volts (tactical precise generator sets only).

p. Under Frequency Indicator (15, figure 2-7). The under frequency indicator is an indicator lamp with a red lens. For Mode I sets in 60 Hz operation, it illuminates when frequency drops to 55 ± 1 Hz. For Mode I sets in 50 Hz operation, it illuminates when frequency drops to 46 ± 1 Hz. For Mode II sets, it illuminates when frequency drops to 370 ± 5 Hz. This indicator is operational on tactical precise sets only.

q. Reverse Power Indicator (16, figure 2-7). The reverse power indicator is an indicator lamp with a red lens. It illuminates when reverse power exceeds 20% and the reverse power protective device actuates.

r. Over Voltage Indicator (17, figure 2-7). The over voltage indicator is an indicator lamp with a red lens. It illuminates when voltage exceeds 153 3 volts and remains for 180 milliseconds and the over voltage protective device actuates.

s. Fault Indicator Fuse (18, figure 2-7). The fault indicator fuse is 1-1/4 x 1/4 inch, glass, 1 amp, 250 volt fuse. It protects the fault indicator circuits from overload.

t. Test or Reset Switch (19, figure 2-7). The test or reset switch is a single pole, momentary on, toggle switch. It permits testing of the fault indicator lamps and resetting of fault indicator lights.

u. DC Circuit Breaker (20, figure 2-7). The dc circuit breaker is a push type circuit breaker. It closes the 24 Vdc circuit from the battery to the controls. The DC circuit breaker is depressed (closed) during generator set operation.

v. Manual Speed Control (21, figure 2-7). The manual speed control is a push-pull control. It controls engine speed and thereby frequency output. A vernier type adjustment allows finer control. This control is inoperable on precise models of the generator set.

w. Battle Short Switch (22, figure 2-7). The battle short switch is a four pole on-off toggle switch. It is protected by a plastic guard. It permits emergency operation by bypassing the protective devices circuits (with the exception of the overspeed and short circuit). The battle short switch also locks out the starter circuit. During normal operation, the battle short switch is in the OFF position.

x. Battle Short Indicator (23, figure 2-7). The battle short indicator is a press-to-test indicator lamp with a red lens. It illuminates when the battle short switch is moved to the ON position and the generator set is operating.

y. Voltage Adjust Rheostat (24, figure 2-7). The voltage adjust rheostat allows adjustment of the generator set output voltage.

z. Synchronizing Lights (25, figure 2-7). The synchronizing lights are indicator lights with clear lens. They indicate the synchronization of frequency when the operation switch is placed in the PARALLEL position for paralleling of the generator sets.

aa. Operations Switch (26, figure 2-7). The operations switch is a four pole, two position, toggle switch. It is placed in the single unit position for single unit operation and in the PARALLEL position for parallel operation.

ab. Voltage Sensing Switch (27, figure 2-7). The voltage sensing switch is a double pole, two position toggle switch. It permits either local or remote monitoring of the voltage regulator circuit.

ac. Panel Light Switch (28, figure 2-7). The panel light switch is a single pole toggle switch. It controls the panel illumination lights.

ad. Frequency Adjust Rheostat (29, figure 2-7). The frequency adjust rheostat increases or decreases the frequency output of the tactical precise generator sets.

NOTE

> The frequency adjust rheostat is functional on the precise generator sets only.

ae. Circuit Breaker Switch (30, figure 2-7). The circuit breaker switch is a three position, momentary-on-momentary-off toggle switch. It opens and closes the main load contactor. The circuit breaker switch is in the center position during normal operation.

af. Circuit Breaker Indicator (31, figure 2-7). The circuit breaker indicator is a press-to-test indicator light with a yellow lens. It illuminates when the main load contactor is closed.

ag. Start-Run-Stop Switch (32, figure 2-7). The start-run-stop switch is a three position toggle switch, used to start and stop the generator set.

ah. Engine Primer Switch (33, figure 2-7). The engine primer switch is a single pole, two position toggle switch. When the START-RUN-STOP switch is in the START position and the ENGINE PRIMER switch is moved to the ON position, and then released, it actuates the ether starting aid. During operation, the switch remains in the OFF position.

ai. Running Time Meter (34, figure 2-7). The running time meter is a time totalizing meter which indicates total engine operating time in hours and tenths of hours.

aj. Battery Charging Ammeter (35, figure 2-7). The battery charging ammeter is a dial indicator type gauge which measures dc current flow to and from the battery. It is calibrated in 1 ampere increments from -10 to +20. Normal indication of the meter is dependent upon the state of charge of the battery. A low charge such as exists immediately after engine starting, will result in a high reading. When enough charge has been restored to the battery the indicator should move near 0.

ak. Fuel Level Gauge (36, figure 2-7). The fuel level gauge is a liquid quantity indicator gauge which is calibrated 1/4 increments of tank quantity from E (empty) to F (full). It indicates the level of fuel in the main fuel tank.

al. Engine Oil Pressure Gauge (37, figure 2-7). The engine oil pressure gauge is a dial indicator type gauge which is calibrated in psig from 0 to 60. It measures engine lubrication oil pressure. Normal indication is from 20 to 55 psig.

am. Coolant Temperature Gauge (38, figure 2-7). The coolant temperature gauge is a dial indicator type gauge which is calibrated in degrees Fahrenheit from 120 to 240. Normal operation indication is 170°F (76.7°C) to 200°F (93.3°C).

an. Fuel Selector Valve (figure 1-2). The fuel selector valve is a three way valve. It selects either the integral tank or the auxiliary source for fuel. It also serves as a shutoff valve.

ao. Frequency Selector Switch (figure 1-1). The frequency selector switch is a two position, positive locking, toggle switch. It is located on the precise relay assembly. The switch changes the generator circuit from 60 Hz to 50 Hz operation. Most applications of the generator set will require that this switch be placed in the 60 Hz position.

NOTE

The frequency selector switch is used on the 50/60 Hz Tactical Precise generator sets only.

ap. Shutter Control Assembly. The shutter control assembly is a thermostatically controlled assembly. It is located at the bottom left of the radiator assembly. The assembly retains the shutter louvers (located behind the grille) in the closed position until the engine coolant has reached normal operating temperature.

Section IV. OPERATION UNDER USUAL CONDITIONS

2-9. GENERAL.

a. The instructions in this section are published for the information and guidance of personnel responsible for operation of the generator set.

b. Instructions are provided for starting and stopping the generator set, operation of the generator set, and coordinating the basic motions necessary to perform the specific tasks for which the generator set was designed. Since nearly every application of the generator set presents a different problem, it may be necessary that the operator vary the given procedures to fit the individual job.

2-10. STARTING THE GENERATOR SET.

a. Preparation for Starting.

(1) If the generator set is to be operated for the first time, refer to paragraph 2-1 and check that the initial checks and services have been performed.

(2) Refer to paragraph 2-3 and check that the installation instructions have been properly accomplished.

(3) Refer to paragraph 2-4 and check that the reconnection board is in the position corresponding to the voltage requirements of the load and that the frequency selector switch is in the correct position.

(4) Refer to table 3-1 and perform the BEFORE OPERATION checks and services.

(5) If an auxiliary fuel supply is used, position the fuel selector valve handle in the AUXILIARY position. If the generator set tank is to be used, position the handle in the SET TANK position.

(6) Close all access doors with the exception of those for the generator air vent and the control cubicle. Lock the generator set air inlet doors in the open position.

(7) Check that the DC circuit breaker is in the closed position.

(8) If the generator set fuel tank is being used, place the START-RUN-STOP switch in the RUN position and the BATTLE SHORT switch in the ON position. Check the fuel level gauge for sufficient fuel indication.

NOTE

On precise generator sets the low oil pressure, under voltage and under frequency indicator lights will illuminate. On utility generator sets, the low oil pressure indicator light will illuminate.

(9) Leave the START-RUN-STOP switch in the RUN position and the BATTLE SHORT switch in the ON position a sufficient length of time to insure that the day tank assembly contains enough fuel for starting.

(10) Place the BATTLE SHORT switch in the OFF position.

(11) Depress the fault location indicator, TEST OR RESET switch and check that all fault location indicator lights illuminate.

(12) On tactical utility generator sets, pull the manual speed control all the way out and then push it in approximately half way.

b. Starting. Refer to figure 2-8 for starting instructions.

2-11. STOPPING THE GENERATOR SET.

a. Normal Stopping.

(1) Refer to figure 2-9 for stopping procedures.

(2) Refer to table 3-1 and perform the AFTER OPERATION checks and services.

b. Stopping by Safety Devices.

NOTE

If any emergency situation requires continued operation of the generator set, the BATTLE SHORT switch may be used to over-ride any of the safety devices except the over-speed and short circuit devices.

The generator set is equipped with safety devices which will automatically stop the engine and simultaneously open the main load contractor upon the occurance of engine overheating, loss of engine oil pressure, engine overspeeding, generator over-voltage, or no fuel. The occurance of short circuits, overloads, generator under voltage, generator under frequency, or reverse power will result in the actuation of a protective device circuit which will automatically open the main load contractor, but will not stop the engine. The actuation of any protective device will result in the illumination of the corresponding indicator light on the fault indicator panel. Actuation ratings for each of the protective devices is given in the tabulated data portion of paragraph 1-6.

2-12. OPERATION OF TACTICAL PRECISE GENERATOR SETS.

a. General. This paragraph provides single unit and parallel operation for both the 50/60 Hz and 400 Hz tactical precise generator sets.

b. Single Unit Operation.

(1) Refer to paragraph 2-10 and start the engine.

(2) Rotate the VOLTS-AMPS transfer switch to each phase position while observing the ac ammeter. If more than rated load is indicated in any phase, reduce the load.

(3) Check the kilowatt meter indication. If the indication is more than 100 percent rated load, reduce the loa

c. Load Connections for Parallel Operation.

NOTE

Prior to attempting parallel operation, ensure all generator sets have the same frequency and voltage output.

WARNING

Lethal voltages are present at the load terminal board of the generator set during operation. Do not attempt to connect or disconnect load leads while the generator set is operating. Do not attempt to connect or disconnect load leads with the generator set shut down and the load connected to another power source, or while the generator set is paralleled to another set which is operating.

WARNING

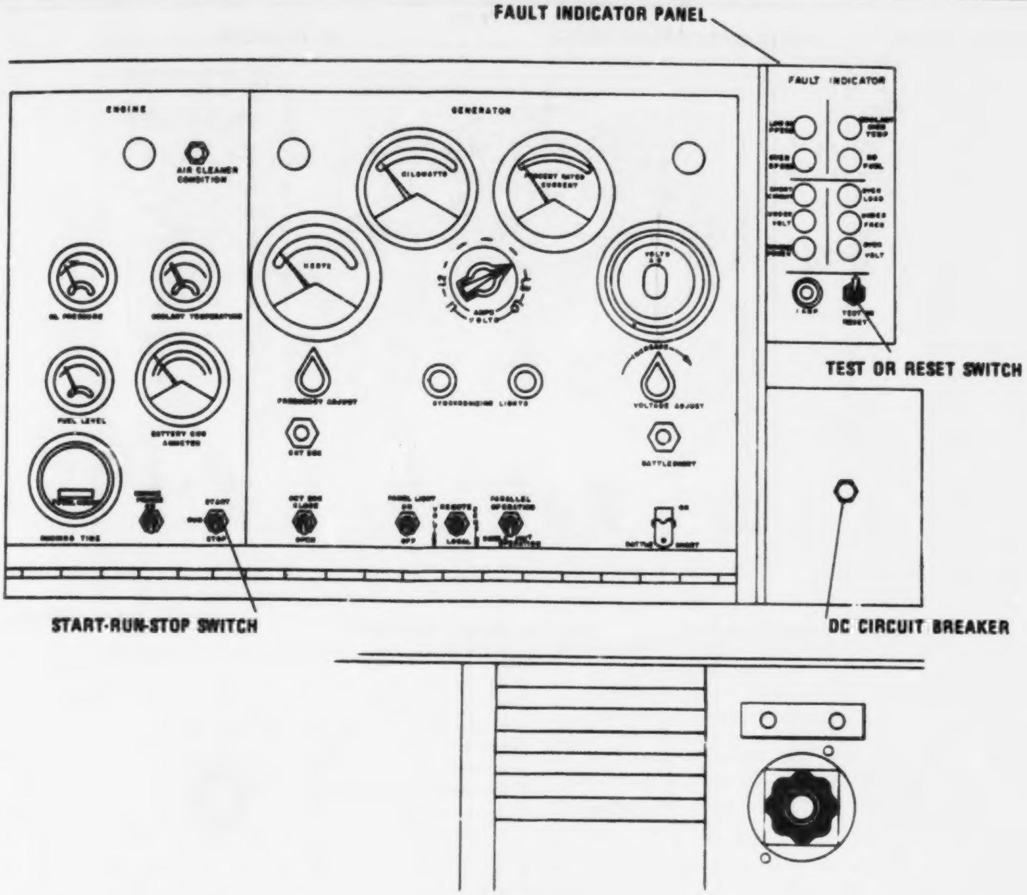
Do not attempt to connect the paralleling cable while either or both of the sets to be paralleled is operating. Make sure that there is no input to the load from another source. Failure to observe this warning may result in death by electrocution.

CAUTION

Precise generator sets equipped with the electric govenor system cannot be paralleled with sets that have the electro hydraulic governor system.

(1) If the generator sets are to share a load greater th the KW rating of a single set, connect load terminal boar as shown in figure 2-4. This arrangement allows for shari or transferring of the load between generator sets.

(2) Open the left access door to the set compartment a remove the safey cover from the terminal board (figure 1-2


FAULT INDICATOR PANEL
FAULT INDICATOR
ENGINE
GENERATOR
AIR CLEANER CONDITION
KILOWATTS
PERCENT RATED CURRENT
HERTZ
VOLTS
TEST OR RESET SWITCH
START-RUN-STOP SWITCH
DC CIRCUIT BREAKER

WARNING

NEVER ATTEMPT TO START THE GENERATOR SET IF IT IS NOT PROPERLY GROUNDED. FAILURE TO OBSERVE THIS WARNING MAY RESULT IN SERIOUS INJURY OR DEATH BY ELECTROCUTION.

WARNING

SLAVE RECEPTACLE IS TO BE USED WHEN EXTRA CRANKING POWER IS REQUIRED FOR STARTING UNIT. OTHER METHODS ARE NOT AUTHORIZED!

CAUTION

DO NOT CRANK THE ENGINE IN EXCESS OF 15 SECONDS. ALLOW THE STARTER ASSEMBLY TO COOL AT LEAST 15 SECONDS BETWEEN CRANKING.

STEP 1. HOLD THE START-RUN-STOP SWITCH IN THE START POSITION UNTIL THE ENGINE OIL PRESSURE GAUGE INDICATES OIL PRESSURE, AND VOLTMETER INDICATES VOLTAGE.

NOTE

USE SLAVE RECEPTACLE (SR1) WHEN EXTRA CRANKING POWER IS REQUIRED.

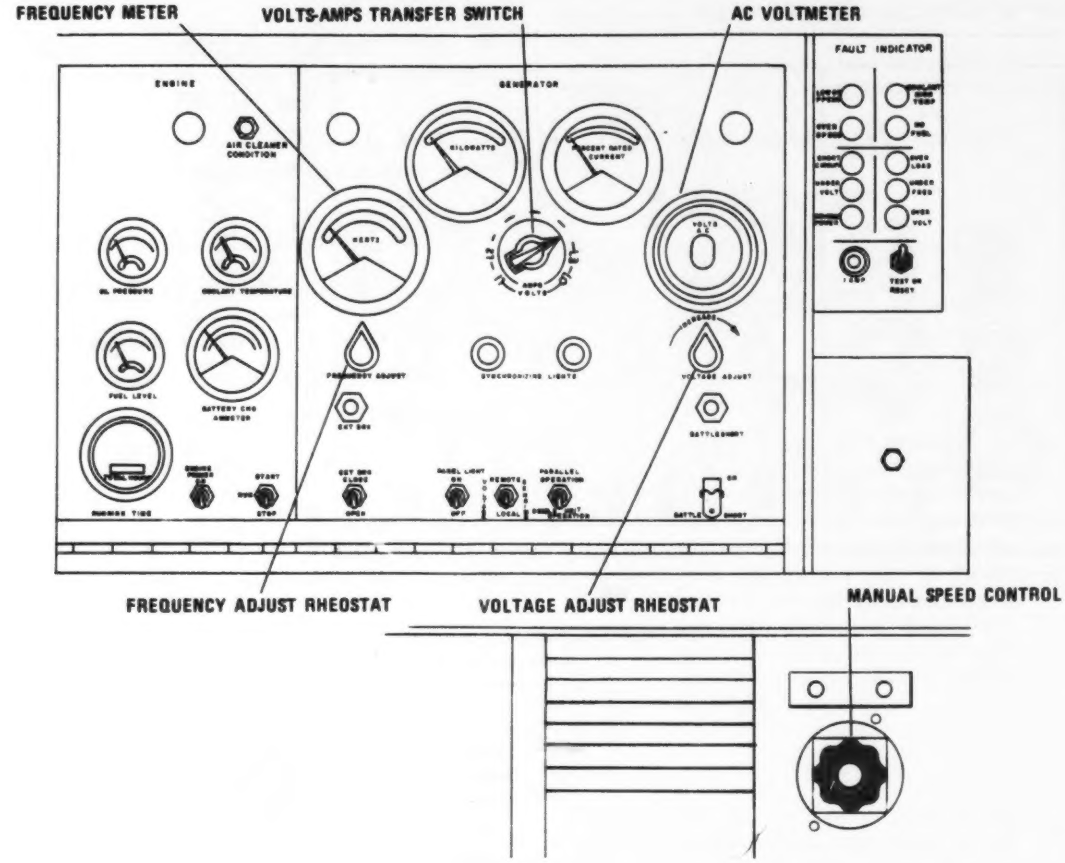
STEP 2. RELEASE THE START-RUN-STOP SWITCH TO THE RUN POSITION.

STEP 3. IF THE AMBIENT TEMPERATURE IS BELOW 50°F (10°C), USE OF THE START AID ASSEMBLY AS FOLLOWS MAY BE REQUIRED.

(a) CRANK THE GENERATOR SET ENGINE.

(b) INJECT A "SHOT" OF ETHER INTO THE AIR CLEANER ASSEMBLY BY PLACING THE ENGINE PRIMER SWITCH IN THE ON POSITION, AND THEN RELEASING.

Figure 2-8. Starting the Generator Set (Sheet 1 of 3)


FREQUENCY METER
VOLTS-AMPS TRANSFER SWITCH
AC VOLTMETER
FAULT INDICATOR
ENGINE
GENERATOR
AIR CLEANER CONDITION
FREQUENCY ADJUST RHEOSTAT
VOLTAGE ADJUST RHEOSTAT
MANUAL SPEED CONTROL

CAUTION

IF THE ENGINE FAILS TO START AFTER INJECTING THREE "SHOTS" OF ETHER, CEASE OPERATION AND NOTIFY MAINTENANCE PERSONNEL.

(c) IF THE ENGINE FAILS TO START WITHIN 15 SECONDS, RELEASE THE START-RUN-STOP SWITCH AND ALLOW THE CRANKING MOTOR TO COOL AT LEAST THREE MINUTES. REPEAT STEPS (a) AND (b).

STEP 4. PLACE THE VOLTS-AMPS TRANSFER SWITCH IN THE DESIRED OPERATING POSITION.

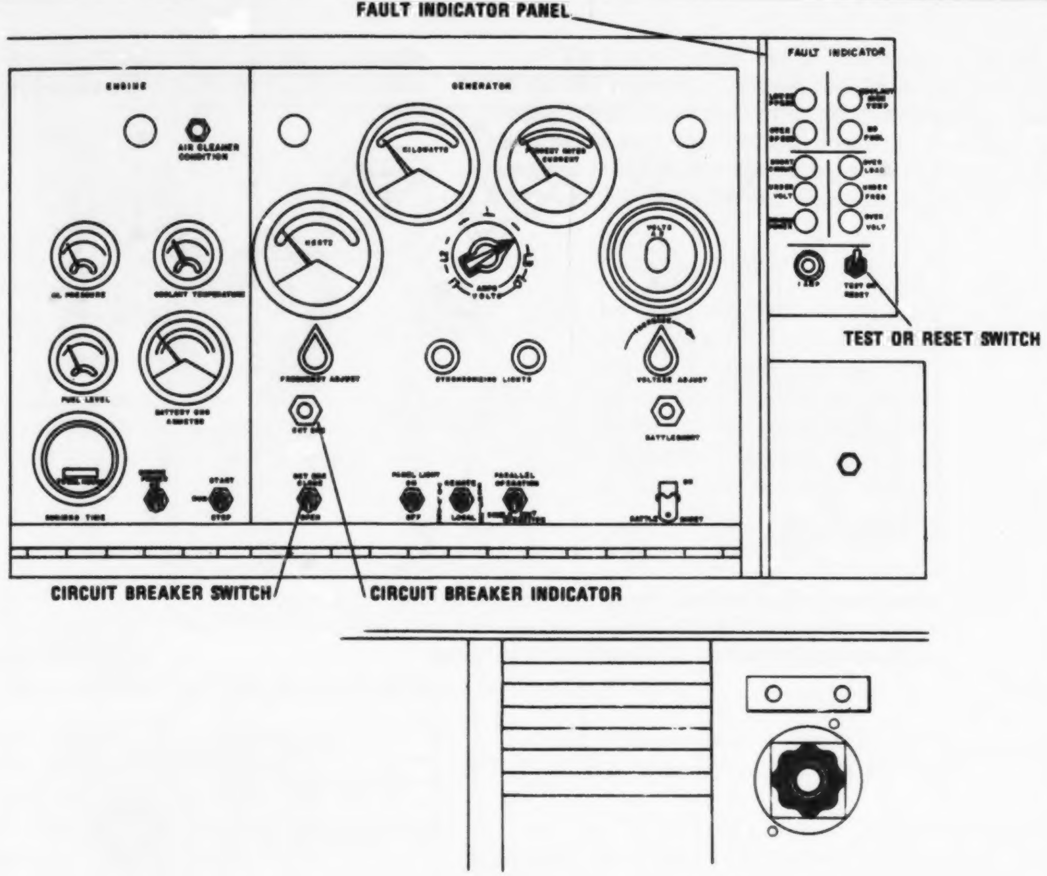
STEP 5. ROTATE THE VOLTAGE ADJUST RHEOSTAT UNTIL THE DESIRED VOLTAGE IS INDICATED ON THE AC VOLTMETER.

STEP 6. ADJUST FREQUENCY TO THE DESIRED VALUE AS INDICATED ON THE FREQUENCY METER.

NOTE: ON TACTICAL PRECISE GENERATOR SETS, FREQUENCY IS ADJUSTED WITH THE FREQUENCY ADJUST RHEOSTAT. ON TACTICAL UTILITY GENERATOR SETS, FREQUENCY IS ADJUSTED WITH THE MANUAL SPEED CONTROL.

ME 5-6115-465-12/2-8 (2)

Figure 2-8. Starting the Generator Set (Sheet 2 of 3)


FAULT INDICATOR PANEL
FAULT INDICATOR
ENGINE
GENERATOR
TEST OR RESET SWITCH
CIRCUIT BREAKER SWITCH
CIRCUIT BREAKER INDICATOR

CAUTION

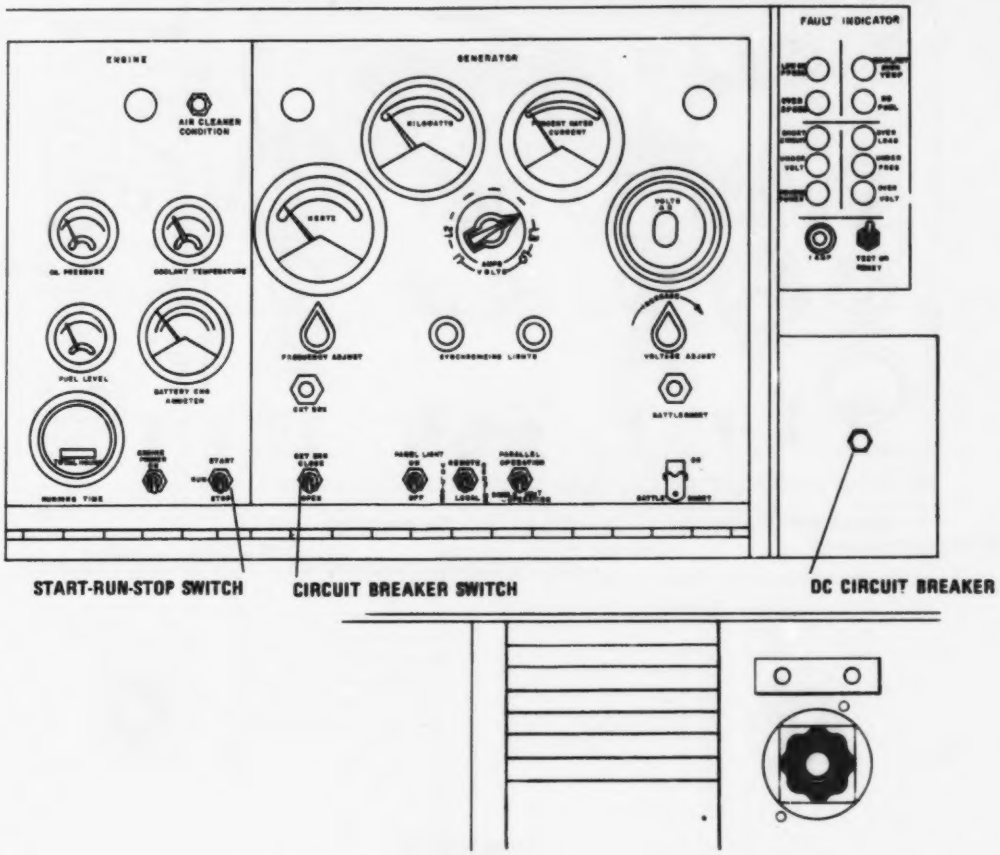
IF ANY OF THE INDICATOR LIGHTS ILLUMINATE, STOP THE GENERATOR SET (PARAGRAPH 2-11) AND CORRECT THE INDICATED FAULT BEFORE PROCEEDING WITH OPERATIONS.

STEP 7. HOLD THE CIRCUIT BREAKER SWITCH IN THE CLOSE POSITION UNTIL THE CIRCUIT BREAKER INDICATOR ILLUMINATES.

STEP 8. OBSERVE ALL ENGINE AND GENERATOR INSTRUMENTS FOR NORMAL READINGS.

ME 5-6115-465-12/2-8 (3)

Figure 2-8. Starting the Generator Set (Sheet 3 of 3)


ENGINE
GENERATOR
FAULT INDICATOR
AIR CLEANER CONDITION
KILOWATTS
PERCENT RATED CURRENT
HERTZ
AMPS VOLTS
VOLTS AC
OIL PRESSURE
COOLANT TEMPERATURE
FUEL LEVEL
BATTERY CHG AMMETER
RUNNING TIME
FREQUENCY ADJUST
SYNCHRONIZING LIGHTS
VOLTAGE ADJUST
START
RUN
STOP
PANEL LIGHT
ON
OFF
REMOTE
LOCAL
PARALLEL OPERATION
CLOSE
OPEN
OVER SPEED
NO FUEL
SHORT CIRCUIT
OVER LOAD
UNDER VOLT
UNDER FREQ
OVER VOLT
LAMP
TEST OR RESET
START-RUN-STOP SWITCH
CIRCUIT BREAKER SWITCH
DC CIRCUIT BREAKER

STEP 1. PLACE THE CIRCUIT BREAKER SWITCH IN THE OPEN POSITION.

STEP 2. ALLOW THE GENERATOR SET TO OPERATE APPROXIMATELY THREE MINUTES WITH NO LOAD APPLIED.
DECREASE ENGINE SPEED TO IDLE.

STEP 3. PLACE THE START-RUN-STOP SWITCH IN THE STOP POSITION.

STEP 4. PLACE DC CIRCUIT BREAKER IN THE OPEN POSITION.

ME 5-6115-465-12/2-9

Figure 2-9. Stopping the Generator Set

(3) Insert load leads through plate and sleeve assembly (figure 1-2) located to the left of the generator set air intake.

NOTE

The load terminal boards will accommodate 2-wire single phase and 4-wire three phase loads. One or more single phase loads can be served alone or in combinations with three phase loads; but the load on any one phase must not exceed 100 percent of the current rating of that phase. Be sure that wire sizes are correct for load to be carried.

(4) Connect the load to terminals marked L1, L2, L3, and LO (figure 2-3).

NOTE

Make certain that the load terminal boards of the sets to be paralleled are connected properly. Reading left to right, phase rotation for the phase loads is L1, L2, L3. Be sure L1 is connected to L1, L2 is connected to L2 etc.

(5) Connect load leads and paralleling cables as shown in figures 2-4 and 2-5.

NOTE

After load connection, tighten binding nuts with plastic/phenolic box end wrench and install safety cover.

NOTE

Paralleling of tactical precise generator sets requires that paralleling cables be installed and the shorting plug located on one of the paralleling receptacles of each generator set be removed.

d. Parallel Operation (Load Sharing).

(1) The first set started shall be designated as "on-line" and the sets in parallel operation shall be designated "on-coming". With all sets shut down install the paralleling cable and connect the load terminal boards as described in paragraph 2-3e. Check that the voltage reconnection boards (paragraph 2-4) of the sets are identically positioned.

CAUTION

Do not place the circuit breaker switch on any of the generator sets in the CLOSE position until specifically directed to do so. Closing the circuit breaker switch at any other time may severely damage one or more of the generator sets.

CAUTION

Check that the main power switch (figure 2-5) at the load is open before attempting to place a generator set on line.

(2) Start the generator sets as described in paragraph 2-10. Do not perform steps 7 & 8 of figure 2-8.

(3) Hold the CKT BRK switch (30, figure 2-7) of the "on-line" set in the CLOSE position until the CKT BRK indicator light (31) illuminates. Place the operation switch (26) in the PARALLEL position.

(4) Adjust the voltage on both sets to the required value. Adjust the frequency of the "on-line" set to the required value. Place the operation switch (26) of the "on-coming" set in the PARALLEL position.

NOTE

Observe the synchronizing lights of the "on-coming" set. The lights should go on and off simultaneously. If the lights go on and off alternately, sets are out of phase. Stop both sets and correct interconnect cables (figure 2-4). If the problem persists, refer to next higher level of maintenance.

(5) Adjust the frequency of the "on-coming" set a little than the "on-line" set. Then reduce the frequency slowly with the frequency adjust rheostat (29) until the synchronizing lights (25) remain on or off at 2 to 3 second intervals.

(6) Carefully observe the synchronizing lights of the “on-coming” set and, at the instant both lights go dark, place the CKT BRK switch (30) of the “on-coming” set to the CLOSE position. When the CKT BRK indicator light (31) illuminates, the sets are operating in parallel.

CAUTION

The kilowatt meter and AC ammeter indicate precentages and do not indicate true KW and ampere readings.

(7) With no external load on the paralleled sets, adjust the frequency adjust rheostat (29) of the “on-coming” set until both rated load meters (kilowatt) read zero. Adjust the voltage adjust rheostat of the “on-coming” set until the percent of rated current meters (ammeters) on both sets read zero. Turning counterclockwise will decrease readings.

(8) Apply load to the sets. The kilowatt load should divide so that the load on each set is equal. If the load and current are not shared equally, adjust the voltage and frequency rheostats of the “on-coming” set until load and current are divided equally between the generator sets.

(9)The current should divide so that the observed difference between the current on any phase between the “on-line” and “on-coming” sets is not more than 20 percent. If the readings are not within 20 percent, notify higher level maintenance.

NOTE

If the reverse power indicator (16) of either set illuminates and the main load contactor opens, open the main power switch and reparallel the generator sets.

CAUTION

When generator sets are being operated in parallel, one or more operators must remain with the sets to monitor the rated load and current meters.

NOTE

Three generator sets can be operated in parallel. Paralleling procedures are the same as those described above. One generator set at a time is brought on line.

CAUTION

Prior to removal of generator sets from parallel operation, make sure the load does not exceed the full load rating of generator set(s) remaining on line.

(10) To remove a generator set from parallel operation, place the circuit breaker switch of the set in the OPEN position. Stop the set as described in paragraph 2-11.

e. Parallel Operation (Load Transfer). The following method of parallel operation is to be used when it is necessary to transfer the load from one set to the other without interrupting power.

NOTE

Visually check that the power cable and parallel cable are in accordance with figure 2-5. If the cables are not attached as indicated, shut down the “on-line” set and follow instructions in paragraph 2-12c.

CAUTION

Do not attempt load connects in paragraph 2-12c unless all sets are off and no other external voltage is applied to the load.

(1) The set in operation shall be designated as “on-line” and the sets placed in parallel operation shall be designated “on-coming”.

(2) Place the operations switch (26, figure 2-7) on both sets in the PARALLEL OPERATION position.

CAUTION

Do not close the circuit breaker switch after starting the “on-coming” set as serious damage to one or both generator sets may result.

(3) Refer to paragraph 2-10 and start the “on-coming” set. Do not perform steps 7 & 8 of figure 2-8.

(4) Note the voltage indicated on the “on-line” set. Adjust the voltage of the “on-coming” set to the voltage noted on the “on-line” set.

(5) Adjust the frequency of the “on-coming” set to a higher value that that of the “on-line” set.

(6) Slowly reduce the frequency of the “on-coming” set until the SYNCHRONIZING LIGHTS (25, figure 2-7) flash at 2 to 3 second intervals.

CAUTION

Do not place the circuit breaker switch of the “on-coming” set in the CLOSE position while the SYNCHRONIZING LIGHTS are lit as damage to one or both generator sets may result.

(7) Carefully watch the SYNCHRONIZING LIGHTS of the "on-coming" set. At the instant both lights go dark, move the circuit breaker switch of the "on-coming" set to the CLOSE position.

(8) Adjust the voltage and frequency rheostats of the "on-coming" set until load and current are divided equally between the two generator sets.

(9) Move the circuit breaker switch (30) of the "on-line" set to the OPEN position.

(10) Place the operations switch of the "on-coming" set to the SINGLE UNIT OPERATION position.

(11) Readjust voltage and frequency of the "on-coming" set as necessary.

(12) Refer to paragraph 2-11 and stop the 'on-line" set.

2-13. OPERATION OF TACTICAL UTILITY GENERATOR SETS.

a. Parallel Operation (Load Sharing).

(1) The first set started shall be designated as "on-line" and the sets in parallel operation shall be designated "on-coming." With all sets shut down connect the load terminal boards as described in paragraph 2-3e. Check that the voltage reconnection boards (paragraph 2-4) of the sets are identically positioned.

CAUTION

Do not place the circuit breaker switch on any of the generator sets in the CLOSE position until specifically directed to do so. Closing the circuit breaker switch at any other time may severely damage one or more of the generator sets.

CAUTION

Check that the main power switch (figure 2-5) at the load is open before attempting to place a generator set on line.

(2) Start the generator sets as described in paragraph 2-10. Do not perform steps 7 & 8 of figure 2-8.

(3) Hold the CKT BRK switch (30, figure 2-7) of the "on-line" set in the CLOSE position until the CKT BRK indicator light (31) illuminates. Place the operation switch (26) in the PARALLEL position.

(4) Set "Volt-Amps Transfer Switch" (5, figure 2-7) in the LI - LO position. Adjust the voltage adjust rheostat (24) until the AC voltmeter indicates 122 volts for the 120/208 connection and 244 volts for the 240/416 connection. Adjust manual speed control (21) until the frequency meter indicates 61 Hertz. Place the operation switch (26) of the "on-coming" set in the PARALLEL position.

NOTE

Observe the synchronizing lights of the "on-coming" set. The lights should go on and off simultaneously. If the lights go on and off alternately, sets are out of phase. Stop both set and correct interconnect cables (figure 2-4). If the problem persists, refer to next higher level of maintenance.

(5) Adjust the manual speed control of the "on-coming" set until the synchronizing lights (25), simultaneously, remain on or off at 2 to 3 second intervals.

(6) Carefully observe the synchronizing lights of the "on-coming" set and, at the instant both lights go dark, place the CKT BRK switch (30) of the "on-coming" set to the CLOSE position. When the CKT BRK indicator light (31) illuminates, the sets are operating in parallel.

(7) With no external load on the paralleled sets, adjust the manual speed control (21) of the "on-coming" set until both percent power meters (kilowatt) indicate zero. Adjust the voltage adjust rheostat (24) of the "on-coming" set until the percent of rated current meters (ammeters) on both sets indicate zero. Turning counterclockwise will decrease readings.

(8) Apply load to the sets. The kilowatt load should divide so that the load on each set is equal. If the load and current are not shared equally, adjust the load by observing the set which has the higher reading on the kilowatt meter (4). Decrease the engine speed of this set by adjusting counterclockwise the manual speed control (21) in small increments. Increase the engine speed of the set with the lower kilowatt reading by adjusting clockwise the manual speed control in small increments. Adjustments should be made between both sets until the kilowatt meters are balanced.

(9) The current should divide so that the observed difference between the current on any phase between the "on-line" and "on-coming" sets is not more that 20 percent. If the readings are not within 20 percent, notify higher level maintenance.

CAUTION

When generator sets are being operated in parallel, one or more operators must remain with the sets to monitor the rated load and current meters. Make further adjustments as required to maintain equal load on the paralleled sets.

CAUTION

Prior to removal of generator set from parallel operation, make sure the load does not exceed the full load rating of set(s) remaining on line.

(10) To remove a generator set from parallel operation, place the circuit breaker switch of that set in the OPEN position. Stop the set as described in paragraph 2-11.

b. Parallel Operation (Load Transfer). The following method of parallel operation is to be used when it is necessary to transfer the load from one set to the other without interrupting power.

NOTE

Visually check that the power cable and parallel cable are in accordance with figure 2-5. If the cables are not attached as indicated, shut down the "on-line" set and follow instructions in paragraph 2-12c.

CAUTION

Do not attempt load connects in paragraph 2-12c unless all sets are off and no other external voltage is applied to the load.

(1) The set in operation shall be designated as "on-line" and sets placed in parallel operation shall be designated "on-coming".

(2) Place the operations switch (26, figure 2-7) on both sets in the PARALLEL OPERATION position.

CAUTION

Do not close the circuit breaker switch after starting the "on-coming" set as serious damage to one or both generator sets may result.

(3) Refer to paragraph 2-10 and start the "on-coming" set. Do not perform steps 7 & 8 of figure 2-8.

(4) Note the voltage indicated on the "on-line" set. Adjust the voltage of the "on-coming" set to the voltage noted on the "on-line" set.

(5) Adjust the frequency of the "on-coming" set to a higher value than that of the "on-line" set.

(6) Slowly reduce the frequency of the "on-coming" set until the SYNCHRONIZING LIGHTS (25, figure 2-7) flash at 2 to 3 second intervals.

CAUTION

Do not place the circuit breaker switch of the "on-coming" set in the CLOSE position while the SYNCHRONIZING LIGHTS are lit as damage to one or both generator sets may result.

(7) Carefully watch the SYNCHRONIZING LIGHTS of the "on-coming" set. At the instant both lights go dark, move the circuit breaker switch of the "on-coming" set to the CLOSE position.

(8) Adjust the voltage and frequency rheostats of both sets until load and current are divided equally between the two generator sets, as explained in paragraph 2-13a steps 7 and 8.

(9) Move the circuit breaker switch (30) of the "on-line" set to the OPEN position.

(10) Place the operations switch of the "on-coming" set to the SINGLE UNIT OPERATION position.

(11) Readjust voltage and frequency of the "on-coming" set as necessary.

(12) Refer to paragraph 2-11 and stop the "on-line" set.

2-14. EXERCISE OF ENGINE ON STANDBY SERVICE.

a. General. The diesel engine of a generator set on standby service which is normally operated under optimum conditions should be exercised at least every 30 days. However, under any extreme environmental condition, the interval between exercise periods should be shortened appropriately. The exercise period should be long enough to enable the engine to attain normal operating temperature.

b. Exercise Procedures.

(1) Perform the before operation checks and services of table 3-1.

(2) Refer to paragraph 2-10 and start the engine.

(3) After allowing sufficient warm up time, run the engine at full speed for the period of time required to obtain two consecutive collant temperature readings at a 15 minute interval of 160°F (71°C) minimum.

(4) Allow the engine to run for an additional 30 minutes while performing the during operation checks and services listed in table 3-1.

(5) Refer to paragraph 2-11 and stop the engine.

(6) Perform the after operation checks and services listed in table 3-1.

(7) Correct any deficiencies note during or after operation.

c. Servicing an Engine on Standby.

(1) Change engine oil and oil filter element at a maximum of 6 months.

(2) Replace the fuel filter elements at a maximum of 12 months.

Section V. OPERATION UNDER UNUSUAL CONDITIONS

2-15. OPERATION IN EXTREME COLD (Below -25°F).

a. General. The generator set is designed to operate in ambient temperatures as low as -25°F (-31°C) without special winterization equipment. For operation at lower temperatures, the engine must be heated by either a fuel burning or electric winterization kit. Refer to paragraph 2-22 and 2-23 for operation instructions for these winterization kits.

b. Cleaning. Keep the generator set and surrounding area as free of ice and snow as practical. Pay particular attention to the fuel tank cap and filler neck.

c. Fuel System. Keep the fuel tank as full as possible to prevent condensation of moisture. Service the fuel tank with the proper grade of fuel for the existing ambient temperatures. Service fuel stainer and filter assembly and secondary fuel filter at more frequent intervals. At the end of operation cycle, drain sediment from the fuel tank, fuel strainer and filter assembly, day tank, and secondary fuel filter.

d. Engine Electrical System. Keep the batteries clean and inspect regularly for cracked and damaged cases. Keep the batteries fully charged at all times to avoid freezing. After adding distilled water to the batteries, operate the engine for at least an hour. Inspect the entire electrical system frequently for cracked, broken and frayed insulation. Tighten any loose connections and mounting clamps.

e. Lubrication. Make sure that lubricants used are as specified for the prevailing ambient temperature by the current Lubrication Order.

f. Cooling System. Use a hydrometer to check the specific gravity of the coolant. Maintain the coolant specific gravity as specified for the prevailing ambient temperature in table 2-1.

2-16. OPERATION IN EXTREME HEAT (Up to 125°F).

a. Cooling System. Check coolant level daily. Maintain coolant level approximately two inches below the radiator overflow pipe. Check that radiator louver control is operating properly. Check louvers and radiator air passages for obstructions frequently. Check fan belt for proper tension. Check coolant temperature gauge frequently for any indication of overheating.

b. Lubrication. Make sure that lubricants used are as specified for the prevailing ambient temperature in the current Lubrication Order.

c. Fuel System. When filling the fuel tank, allow sufficient space for fuel expansion.

d. Batteries. Check electrolyte level frequently. Add distilled water as required to compensate for evaporation.

e. Generator. Keep the generator clean and free of dirt. Make sure that the generator ventilating screen is free of obstructions which would inhibit air flow.

f. Engine. Keep the external surface of the engine as clean as possible.

2-17. OPERATION IN DUSTY OR SANDY AREAS.

a. General. If possible, provide a shelter for the generator set. Use available natural barriers to shield the generator set from blowing dust or sand. Keep all access doors closed as much as possible to prevent entry of dust and sand into the enclosure assembly. If water is available, wet down dusty surface areas around the set frequently.

b. Cleaning. Wipe dust and sand from the generator set components frequently. When the generator set is not operating, the exterior surface should be thoroughly washed down with clean water.

c. Engine. Shorten the service interval for the engine air cleaner and oil filter to compensate for intake of additional dust or dirt. Keep the external surface of the engine as clean as possible.

d. Fuel System. Drain sediment from the fuel tank, fuel strainer, and fuel filters frequently. Be particularly careful to prevent dust or dirt from entering the fuel tank. Shorten the service intervals for the fuel filters appropriately.

e. Lubrication. Lubrication intervals must be shortened appropriately. Use particular care to keep lubricants from becoming contaminated with dust or dirt.

2-18. OPERATION UNDER RAINY OR HUMID CONDITIONS.

a. General. If possible, provide a shelter for the generator set. Keep the generator set doors closed as much as possible. Cover the generator set with canvas or other waterproof material when it is not being operated. Provide adequate drainage to prevent water from accumulating on the operation site.

b. Lubrication. Keep the generator set well lubricated to protect components from moisture. Use caution to keep lubricants from becoming contaminated with water.

c. Fuel System. Keep the fuel tank as full as is practical to keep moisture condensation to a minimum. Drain water from fuel tank, day tank, and filters daily. Service the fuel filters more frequently than under normal operating conditions.

d. Electrical System. Wipe the electrical system components dry before and after each period of operation.

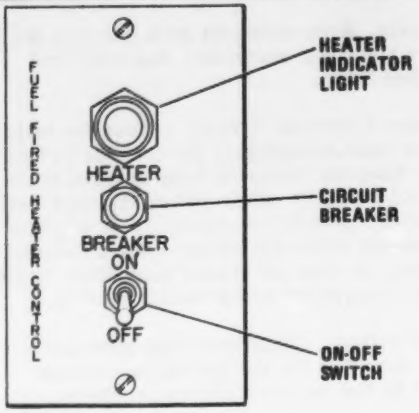
e. Rust Prevention. Remove moisture from the generator set components before and after each operating period. Clean and repaint any rusty surfaces. Remove peeling or blistered paint and repaint.

2-19. OPERATION IN SALT WATER AREAS.

a. Protection. If possible, provide a shelter for the generator set. Locate the generator set so that the radiator faces into the prevailing winds. Utilize natural barriers or, if possible, fabricate a barrier to protect the generator set from salt spray. Keep the generator set covered when not in use and keep all access doors closed as much as possible.

b. Cleaning. When the generator set is not operating, wash the exterior surfaces off frequently with clean water.

c. Rust Prevention. Clean and repaint any rusty or corroded surfaces. Remove any defective paint and repaint.



NOTE: REFER TO THE FUEL BURNING WINTERIZATION SYSTEM DIAGRAM AND INSTRUCTION PLATE LOCATED ON THE INSIDE FACE OF THE LEFT SIDE ENGINE COMPARTMENT ACCESS DOOR FOR ADDITIONAL INSTRUCTIONS.

STEP 1. TURN THE MANUAL HEATER VALVE IN THE HEATER FUEL SUPPLY LINE AT THE DAY TANK ASSEMBLY TO THE OPEN POSITION.

STEP 2. OPEN THE SHUT OFF VALVES IN THE CYLINDER BLOCK COOLANT LINES.

STEP 3. IF GENERATOR SET IS EQUIPPED WITH BOTH FUEL BURNING AND ELECTRIC WINTERIZATION KITS, PLACE THREE-WAY VALVE POINTER IN OIL PAN COOLANT LINE IN THE 3 O'CLOCK POSITION.

STEP 4. DEPRESS CIRCUIT BREAKER ON HEATER CONTROL PANEL TO ACTIVATE HEATER CONTROL CIRCUITS.

STEP 5. PRESS IN ON HEATER INDICATOR LIGHT. IF IT DOES NOT ILLUMINATE, NOTIFY HIGHER LEVEL MAINTENANCE.

CAUTION

IF HEATER FAILS TO IGNITE WITHIN THE SPECIFIED TIME, DO NOT ATTEMPT TO RESTART. THE IGNITION OF RESIDUAL FUEL VAPOR IN THE COMBUSTION CHAMBER MAY RESULT IN A MINOR EXPLOSION CAUSING DAMAGE TO THE HEATER.

STEP 6. PLACE THE ON-OFF SWITCH IN THE ON POSITION. IF HEATER INDICATOR LIGHT DOES NOT ILLUMINATE WITHIN FOUR MINUTES, RETURN THE ON-OFF SWITCH TO THE OFF POSITION AND NOTIFY MAINTENANCE PERSONNEL.

STEP 7. ALLOW THE HEATER TO OPERATE UNTIL IT CYCLES "OFF" OR FOR 55 MINUTES, WHICHEVER OCCURS FIRST.

STEP 8. REFER TO PARAGRAPH 2-10 AND START THE ENGINE.

STEP 9. AFTER ENGINE STARTS, PLACE ON-OFF SWITCH IN THE OFF POSITION.

NOTE: THE HEATER BLOWER WILL CONTINUE TO OPERATE AFTER COMBUSTION SHUTDOWN TO CLEAR THE COMBUSTION CHAMBER OF RESIDUAL FUEL VAPOR.

STEP 10. TURN THE THREE-WAY VALVE HANDLE UNTIL THE POINTER IS IN THE 9 O'CLOCK POSITION.

STEP 11. CLOSE THE SHUTOFF VALVES IN THE CYLINDER BLOCK COOLANT LINES.

STEP 12. WHEN HEATER INDICATOR LIGHT GOES OUT, PULL OUT CIRCUIT BREAKER TO DE-ENERGIZE HEATER CONTROL CIRCUITS.

Figure 2-10. Operating the Fuel Burning Winterization Kit

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2-20. OPERATION AT HIGH ALTITUDES.

The generator set will operate at elevations up to 5000 feet above sea level without special adjustment or reduction in load. At 8000 feet above sea level, the kilowatt rating is reduced approximately 10 percent. Refer to paragraph 1-6 for additional information.

2-20A. OPERATION USING NATO SLAVE CABLE.

The existing Army Slave Cable has end connectors with two pins to mate with the Slave Receptacle on the Generator Set (fig 1-1). The NATO Slave Cable has end connectors with one pin. In order to utilize the NATO Slave Cable on the Generator Set, an Adapter Connector must be used. See Additional Authorization List (AAL) for Adapter Connector.

CAUTION

Before you use any cable, make sure the master battery switches and all electrical switches in both the live and dead equipment are in the OFF position. If you attempt to install the cable into live operating equipment, arcing can occur. You can get burned and your cable will be damaged.

Section VI. OPERATION OF EQUIPMENT USED IN CONJUNCTION WITH THE GENERATOR SET

2-21. GENERAL.

This section provides the information and instructions necessary for the effective operation of auxiliary equipment used in conjunction with the generator set. Included are the fuel burning winterization kit, electric winterization kit, wheel mounting kit, and load bank.

2-22. FUEL BURNING WINTERIZATION KIT.

a. General. The fuel burning winterization kit is utilized to preheat the engine coolant and lubricating oil in extremely cold weather. In ambient temperatures of −65°F (−53.9°C) the winterization kit should be placed in operation a minimum of 55 minutes prior to starting the generator set.

b. Controls and Indicators.

(1) Heater Indicator Light (figure 2-10). The heater indicator light is a press-to-test indicator light with a yellow lens. It illuminates when the winterization kit is in operation.

(2) Circuit Breaker (figure 2-10). The circuit breaker is a trip-free, push-pull type circuit breaker. It opens and closes the 24 Vdc circuit to the heater controls.

(3) ON-OFF Switch (figure 2-10). The ON-OFF switch is a double pole, two position toggle switch. When the switch is placed in the ON position, it closes the 24 Vdc circuit to the fuel pump and the igniter.

c. Operation. Refer to figure 2-10 for operating instructions.

2-23. ELECTRIC WINTERIZATION KIT.

a. General. The electric winterization kit uses an external power source to maintain the engine coolant and lubricating oil at normal operating temperature in standby situations which require immediate starting of the generator set. The kit will function effectively down to an ambient temperature of −65°F (−53.9°C). Coolant from the radiator is pumped into the heater assembly where it is heated by the heater elements. The heated coolant is circulated through the heat exchanger in the engine oil pan and through the cylinder block. After leaving the cylinder block, the coolant is returned to the radiator. Power for operation of the electric winterization kit may be obtained from any 208 to 240 volt, 50/60 Hz or 400 Hz, single phase source.

b. Controls and Indicators.

(1) Circuit Breaker (figure 2-11). The circuit breaker is a trip-free, push-pull type circuit breaker. It opens and closes the circuit to the winterization kit controls.

(2) POWER ON Indicator (figure 2-11). The power on indicator is a press-to-test type indicator light. It illuminates when power is applied to the heater control circuits.

(3) ON-OFF Switch (figure 2-11). The ON-OFF switch is a two-pole, two position switch. It opens and closes the two heater and the coolant pump motor circuits.

(4) HEATER ON Indicator (figure 2-11). The HEATER ON indicator is a press-to-test type indicator light. It illuminates when the kit is in operation.

c. Operation. Refer to figure 2-11 for operating instructions.

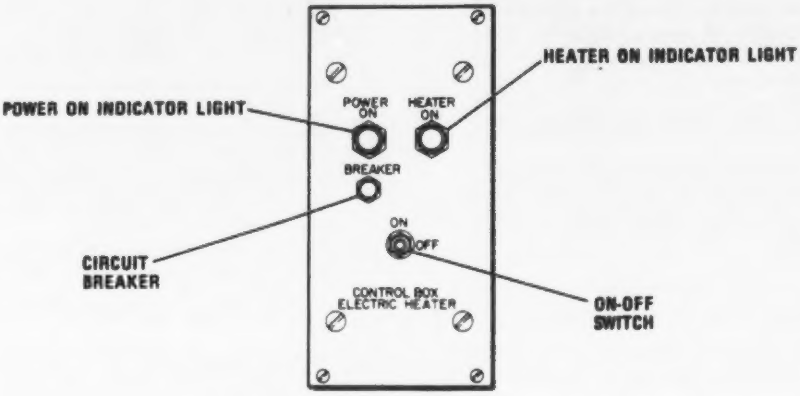
2-24. WHEEL MOUNTING KIT.

a. General. The wheel mounting kit extends the mobility of the generator set. It consists of a pair of two-wheeled axles which are bolted to the generator set skid frame. The front axle is equipped with a tow bar and safety chain. The front wheels are swivel mounted for steering. The rear axle is equipped with a parking brake.

b. Using the Wheel Mounting Kit. Refer to figure 2-12 for operating instructions.

2-25. LOAD BANK KIT.

a. General. The load bank kit is an air cooled, balanced, three phase resistive load which may be operated at either 120/208 or 240/416 volts. It provides up to 50 percent of the generator set rated load to minimize carbon buildup in the engine while the generator set is carrying a light load. The load bank incorporates protective devices which



CAUTION

DO NOT ATTEMPT TO OPERATE THE ELECTRIC WINTERIZATION KIT IF THE GENERATOR SET IS EQUIPPED WITH A FUEL BURNING WINTERIZATION KIT WHICH IS OPERATING.

NOTE: REFER TO THE ELECTRIC WINTERIZATION SYSTEM DIAGRAM AND INSTRUCTIONS PLATE LOCATED ON THE INSIDE FACE OF THE LEFT SIDE ENGINE COMPARTMENT ACCESS DOOR FOR ADDITIONAL INFORMATION.

STEP 1. IF THE GENERATOR SET IS EQUIPPED WITH A FUEL BURNING WINTERIZATION KIT, TURN THE HANDLE OF THE THREE-WAY VALVE IN THE OIL PAN COOLANT LINE UNTIL THE POINTER IS IN THE 12 O'CLOCK POSITION.

STEP 2. OPEN BOTH SHUTOFF VALVES IN THE CYLINDER BLOCK COOLANT LINES.

STEP 3. DEPRESS THE CIRCUIT BREAKER TO ENERGIZE THE HEATER CONTROL CIRCUITS.

STEP 4. DEPRESS POWER ON AND HEATER ON INDICATOR LIGHTS. IF THEY DO NOT ILLUMINATE WHEN DEPRESSED, NOTIFY HIGHER LEVEL MAINTENANCE.

STEP 5. PLACE ON-OFF SWITCH IN THE ON POSITION. IF BOTH POWER ON AND HEATER ON INDICATOR LIGHTS DO NOT ILLUMINATE, CHECK FUSE. IF FUSE IS SERVICEABLE, CHECK INDICATOR LAMPS (paragraph 4-13d.). IF LAMPS ARE SERVICEABLE, CEASE OPERATION AND NOTIFY HIGHER LEVEL MAINTENANCE.

STEP 6. PRIOR TO STARTING THE GENERATOR SET, TURN THE THREE-WAY VALVE HANDLE UNTIL THE POINTER IS IN THE 9 O'CLOCK POSITION AND CLOSE BOTH SHUTOFF VALVES IN THE CYLINDER BLOCK COOLANT LINES.

STEP 7. PLACE THE ON-OFF SWITCH IN THE OFF POSITION.

CAUTION

DO NOT START THE GENERATOR SET WHILE THE ON-OFF SWITCH IS IN THE ON POSITION.

STEP 8. REFER TO PARAGRAPH 2-10 AND START THE GENERATOR SET.

Figure 2-11. Operating the Electric Winterization Kit

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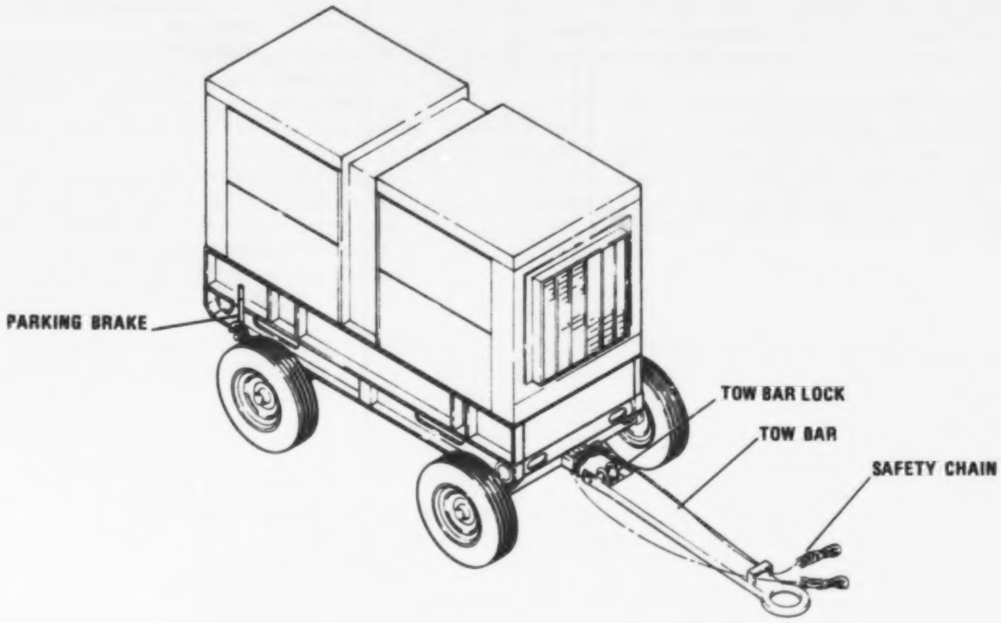

STEP 1. RELEASE THE TOW BAR LOCK AND LOWER THE TOW BAR.

STEP 2. ATTACH THE TOW BAR AND SAFETY CHAINS TO THE TOWING VEHICLE.

STEP 3. RELEASE THE PARKING BRAKE.

CAUTION

DO NOT TOW THE GENERATOR IN EXCESS OF 5 MPH ON PAVED ROADS.

STEP 4. TOW THE GENERATOR SET TO THE DESIRED POSITION.

STEP 5. ENGAGE THE PARKING BRAKE AND DISCONNECT THE SAFETY CHAINS AND TOW BAR FROM THE TOWING VEHICLE.

STEP 6. RAISE THE TOW BAR UNTIL THE TOW BAR LOCK ENAGES.

Figure 2-12. Using the Wheel Mounting Kit

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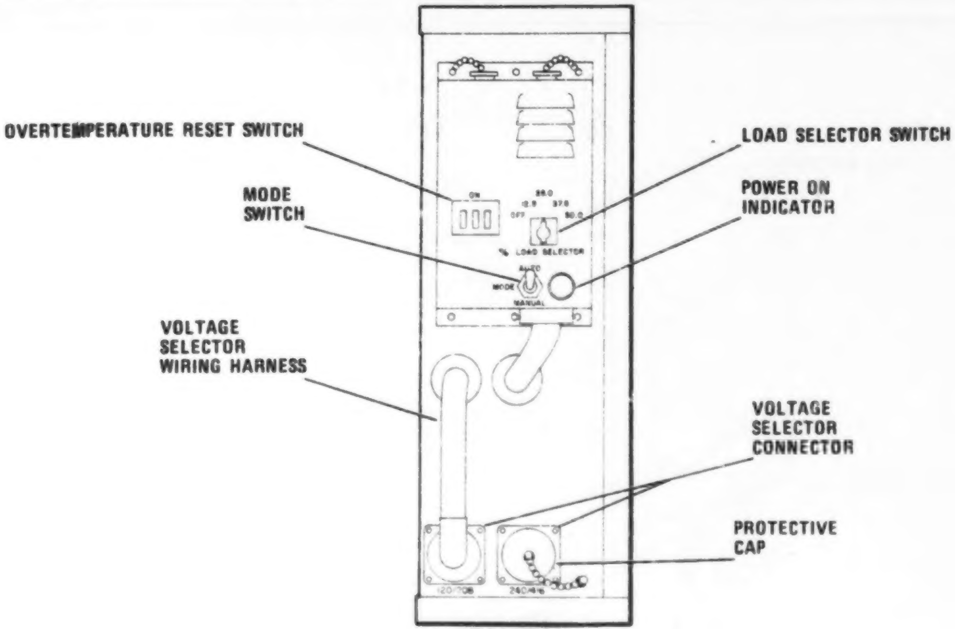
OVERTEMPERATURE RESET SWITCH
MODE SWITCH
VOLTAGE SELECTOR WIRING HARNESS
LOAD SELECTOR SWITCH
POWER ON INDICATOR
VOLTAGE SELECTOR CONNECTOR
PROTECTIVE CAP
ON
25.0
12.5
37.5
OFF
50.0
% LOAD SELECTOR
AUTO
MODE
MANUAL
120/208
240/416

CAUTION

ALWAYS CHECK THE POSITION OF THE GENERATOR SET VOLTAGE RECONNECTION BOARD BEFORE PLACING THE LOAD BANK IN OPERATION. DAMAGE TO THE LOAD BANK WILL RESULT IF IT IS OPERATED AT A VOLTAGE DIFFERENT FROM THE GENERATOR SET OUTPUT VOLTAGE.

STEP 1. CONNECT THE VOLTAGE SELECTOR WIRING HARNESS TO THE VOLTAGE SELECTOR CONNECTOR CORRESPONDING TO THE GENERATOR SET OPERATING VOLTAGE.

STEP 2. INSTALL THE PROTECTIVE CAP OVER THE REMAINING CONNECTOR.

CAUTION

DO NOT ALLOW THE GENERATOR SET TO OPERATE UNATTENDED WITH THE MODE SWITCH IN THE MANUAL POSITION.

STEP 3. PLACE THE MODE SWITCH IN THE DESIRED OPERATING POSITION.

STEP 4. POSITION THE OVER TEMPERATURE RESET SWITCH TO THE ON POSITION.

CAUTION

DO NOT ALLOW LOAD BANK AND GENERATOR SET LOAD TO EXCEED THE RATED LOAD OF THE GENERATOR SET.

STEP 5. POSITION THE LOAD SELECTOR SWITCH TO THE PERCENT LOAD WHICH, WHEN ADDED TO THE GENERATOR SET LOAD, WILL MOST NEARLY EQUAL, BUT NOT EXCEED, 100 PERCENT OF THE GENERATOR SET RATED LOAD.

STEP 6. CHECK THAT LOAD BANK POWER ON INDICATOR LIGHT IS LIT. IF IT IS NOT, PRESS IN ON THE LENS. IF THE LAMP ILLUMINATES BUT GOES OUT WHEN RELEASED, RETURN THE LOAD SELECTOR SWITCH TO THE OFF POSITION. NOTIFY MAINTENANCE PERSONNEL.

STEP 7. TO REMOVE THE LOAD BANK FROM OPERATION, POSITION THE LOAD SELECTOR SWITCH TO THE OFF POSITION AND PLACE THE OVER TEMPERATURE RESET SWITCH TO THE OFF POSITION.

Figure 2-13. Operating the Load Bank

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automatically removes its load should the generator become overloaded. The load bank kit will also automatically cease operation in the event that it overheats.

b. Controls and Indicators.

(1) Voltage Selector Connectors (figure 2-13). The voltage selector connectors are electrical connectors. They are used to reconnect the load bank circuits for 120/208 Vac or 240/416 Vac operation.

(2) Over Temperature Reset Switch (figure 2-13). The OVER TEMPERATURE RESET switch is a triple circuit breaker. The switch trips automatically to open the load bank circuits to remove the unit from operation in the event of overheating. It is reset manually.

(3) Load Selector Switch (figure 2-13). The LOAD SELECTOR switch is a five position rotary type switch. It is graduated in 12.5 percent increments which is 1/8 of the generator set rated load. It actuates the load bank power circuits.

(4) Load Bank Power On Indicator (figure 2-13). The LOAD BANK POWER ON indicator is a press-to-test type indicator light with a red lens. It illuminates when power is applied to the load bank.

(5) Mode Selector Switch. The mode selector switch is a two position switch. When placed in the AUTO position, the load bank will automatically dump the load in the event that generator set load exceeds 81% of rated value. When the switch is placed in MANUAL position, the load must be manually removed.

c. Operation. Refer to figure 2-13 for operating instructions.

CHAPTER 3

OPERATOR AND ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

Section I. OPERATOR AND ORGANIZATIONAL MAINTENANCE REPAIR PARTS, TOOLS AND EQUIPMENT

3-1. TOOLS AND EQUIPMENT. (Not Applicable to Air Force.)

The tools required to perform operator and organizational maintenance on the generator set are listed in Appendix C. of this manual.

3-2. ORGANIZATIONAL MAINTENANCE REPAIR PARTS.

Organizational maintenance repair parts are listed and illustrated in the Organizational, Intermediate (Field) (Direct and General Support) and Depot Maintenance Repair Parts and Special Tools List.

Section II. LUBRICATION

3-3. GENERAL LUBRICATION INFORMATION.

a. This paragraph contains a reproduction of the lubrication order and lubrication instructions which are supplemental to, and not specifically covered in the Lubrication Order.

b. The Lubrication Order shown in figure 3-1 is an exact reproduction of the approved lubrication order.

CAUTION

The dipstick is marked to indicate that the crankcase oil level may be checked and oil added while the engine is running or stopped. Always make sure the correct side of the dipstick is checked. When checking oil with engine running, remove oil filler cap.

c. When changing the engine crankcase oil, never fill the crankcase above the FULL mark on the dipstick. Do not allow the oil level to fall below the ADD mark on the dipstick. Service the oil filter element each time that the crankcase oil is changed.

d. A seal in the dipstick cap prevents oil from leaking from the crankcase and foreign material from entering. Keep the dipstick firmly seated on the adapter tube at all times.

e. Keep the crankcase breather tube open at all times to prevent pressure build-up in the engine crankcase which will cause oil leakage from the crank shaft seals.

3-4. DETAILED LUBRICATION INFORMATION.

a. General. Keep all lubricants in closed containers and store in a clean, dry place away from external heat. Allow no dust, dirt or other foreign material to mix with the lubricants. Keep all lubrication equipment clean and ready for use.

b. Cleaning. Keep all external parts not requiring lubrication free of lubricants. Before lubricating the generator set, wipe all lubrication points free of dirt and grease. Clean all lubrication points after lubricating to prevent accumulation of foreign matter.

c. Engine Oil.

(1) The crankcase oil level must be checked at eight hour intervals or more often should oil consumption increase.

(2) A new or reconditioned engine shall have the oil changed after 50 hours of operation. Thereafter, the interval is lengthened to that described dependent on operating conditions.

(3) Before draining the engine crankcase, operate the engine until the engine coolant reaches a minimum of 140°F (60°C) to insure maximum suspension and drainage of particles.

(4) Stop the engine. Remove the oil pan drain plug and open the oil pan drain valve, to drain the crankcase.

LUBRICATION ORDER

LO 06858A/06858A-12

LO 5-6115-465-12

(Supersedes LO5-6115-465-12, 23 February 1979)

GENERATOR SET, DIESEL ENGINE DRIVEN, TACTICAL, SKID MTD, 30 KW, 3 PHASE, 4 WIRE, 120/208 AND 240/416 VOLTS

DOD MODEL	CLASS	HERTZ	NSN
MEP-005A	UTILITY	50/60	6115-00-118-1240
MEP-104A	PRECISE	50/60	6115-00-118-1247
MEP-114A	PRECISE	400	6115-00-118-1248

Reference: TM 6115-465-12 and C9100-IL

Hard time intervals and the related task-hour times are based on normal operation. The task-hour time specified is the time you need to do all the services prescribed for a particular interval. Change the interval if your lubricants are contaminated or if you are operating the equipment under adverse operating conditions, including longer-than-usual operating hours. The interval may be extended during periods of low activity. If extended, adequate preservation precautions must be taken.

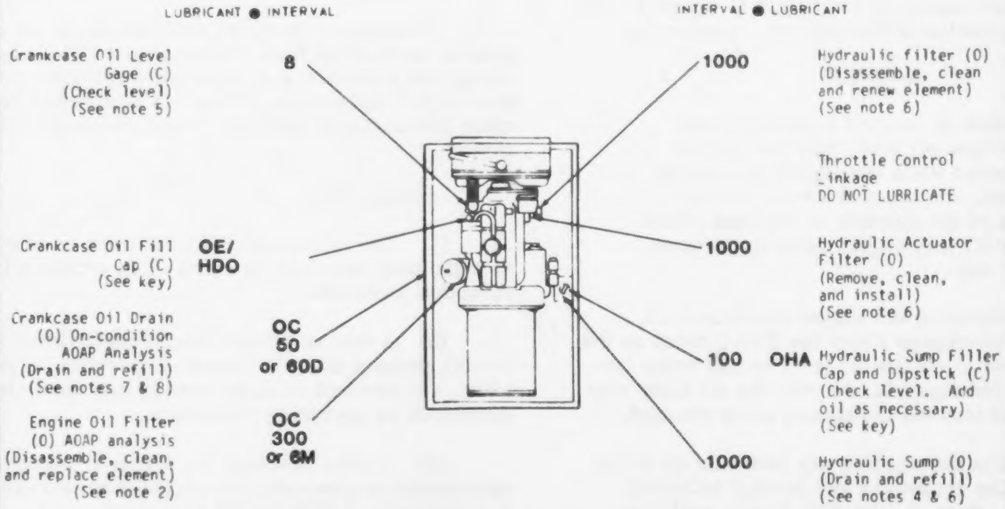
On-condition (OC) intervals for oil changes, shall be determined by the Army Oil Analysis Program (AOAP) laboratory and shall be applied unless otherwise notified.

Hard time oil change intervals will be applied in the event AOAP laboratory support is not available.

*The time specified is the time required to perform all services at the particular interval (On-condition or hard time).

Clean fittings before lubricating. Lubricate points indicated by dotted arrow shaft on both sides of equipment. Clean parts with drycleaning SOLVENT (SD), type II or equivalent. Dry before lubricating. Drain crankcase when HOT. Fill and check level. The lowest level of maintenance authorized to lubricate a point is indicated by one of the following: (C) Operator/Crew; or (O) Organizational Maintenance.

You can help improve this publication. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms) should be mailed directly to: Commander, US Army Troop Support Command, ATTN: AMSTR-MCTS, 4300 Goodfellow Blvd, St. Louis, MO 63120-1798. A reply will be furnished to you.


LUBRICANT ● INTERVAL
INTERVAL ● LUBRICANT
Crankcase Oil Level Gage (C) (Check level) (See note 5)
8
Crankcase Oil Fill Cap (C) (See key)
OE/HDO
Crankcase Oil Drain (O) On-condition AOAP Analysis (Drain and refill) (See notes 7 & 8)
OC 50 or 60D
Engine Oil Filter (O) AOAP analysis (Disassemble, clean, and replace element) (See note 2)
OC 300 or 6M
1000
Hydraulic filter (O) (Disassemble, clean and renew element) (See note 6)
Throttle Control Linkage DO NOT LUBRICATE
1000
Hydraulic Actuator Filter (O) (Remove, clean, and install) (See note 6)
100
OHA
Hydraulic Sump Filler Cap and Dipstick (C) (Check level. Add oil as necessary) (See key)
1000
Hydraulic Sump (O) (Drain and refill) (See notes 4 & 6)

*TOTAL TASK-HR		*TOTAL TASK-HR	
INTERVAL	TASK-HR	INTERVAL	TASK-HR
8	0.1	50H or 60D	0.6
100	0.1	1000	1.0

Figure 3-1. Lubrication Order (Sheet 1 of 2)

- KEY -

LUBRICANTS		CAPACITY	EXPECTED TEMPERATURES			For arctic operation refer to FM 9-207	INTERVALS
			ABOVE +32°F (ABOVE 0°C)	+40°F TO -10°F (+5°C TO -23°C)	0°F TO -65°F (-18°C TO -50°C)		
OE/HDO (MIL-L-2104C)	LUBRICATING OIL, Engine		OE/HDO 30	OE/HDO 10	OEA		Intervals given are in hours of normal operation
	Engine Crankcase (Add one additional quart for filter)	8 qts (7.6L)					
	Oil Can Points						
OEA (MIL-H-46167)	Oil, Engine, Subzero						
OHA (MIL-H-5606B)	HYDRAULIC FLUID Hydraulic Sump	4 qts (3.8L)	OHA				

NOTES:

1. FOR OPERATION OF EQUIPMENT IN PROTRACTED COLD TEMPERATURES BELOW -10°F (-23°C). Remove lubricants prescribed in the key for temperatures above -10°F (-23°C). Clean parts with drycleaning SOLVENT (SD), type II or equivalent. Lubricate with lubricants specified in the key for temperatures 0°F to -65°F.

2. ENGINE OIL FILTER. Every 300 hours remove filter element, clean housing, install new element, fill crankcase, operate engine for 5 minutes, check for leaks, check crankcase oil level, and bring to FULL mark. Oil filter replacement interval shall aline with on-condition AOAP or hard time oil change requirements. See notes 7 and 8.

3. OIL CAN POINTS. Every 100 hours lubricate the door hinges, latches, control linkages, and all exposed adjusting threads with OE/HDO.

4. HYDRAULIC SUMP. To drain, remove hydraulic line from actuator and drain oil into a suitable container. Replace hydraulic line, fill tank, and check level.

5. CRANKCASE. Crankcase level may be checked with the engine in either a static or operating condition.

6. HYDRAULIC FILTER, HYDRAULIC ACTUATOR FILTER, AND HYDRAULIC SUMP. Precise sets only.

7. CRANKCASE OIL. A sample of the oil shall be sent to an AOAP laboratory for analysis at an interval of 50 hours or 60 days. Refer to TB 43-0210 for sampling requirements.

8. When AOAP laboratory support is not available, drain and refill crankcase oil at 300 hours or 6 months.

Copy of this Lubrication Order will remain with the equipment at all times; instructions contained herein are mandatory.

By Order of the Secretaries of the Army, the Navy, and the Air Force:

JOHN A. WICKHAM, JR.
General, United States Army
Chief of Staff

Official:

R. L. DILWORTH
Brigadier General, United States Army
The Adjutant General

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Rear Admiral, CEC, US Navy
Commander
Naval Facilities Engineering Command

CHARLES A. GABRIEL, *General USAF*
Chief of Staff

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EARL T. O'LOUGHLIN
General, USAF, Commander, Air Force
Logistics Command

GEORGE B. CRIST
Lieutenant General, USMC
Deputy Chief of Staff for Installations and Logistics

Figure 3-1. Lubrication Order (Sheet 2 of 2)

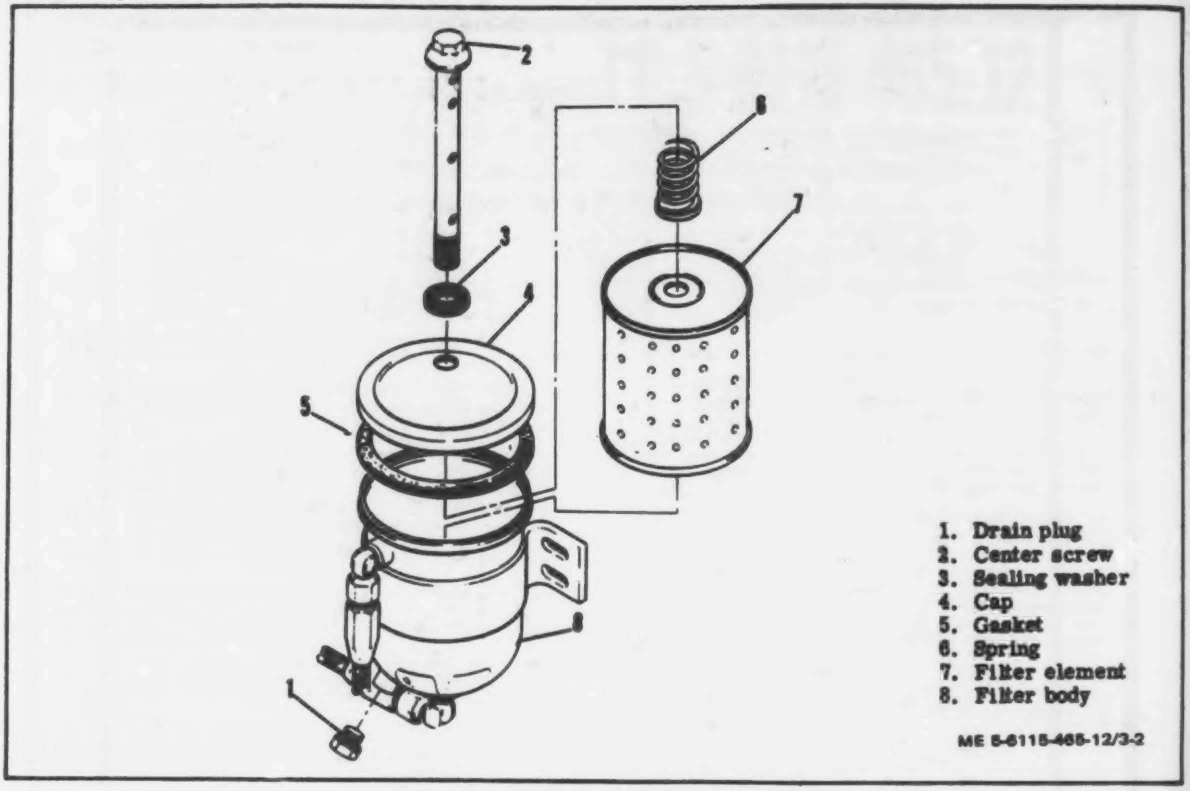


Figure 3-2. Servicing the Engine Oil Filter

(5) Close the oil pan drain valve and install the drain plug.

(6) Refer to paragraph d. below and service the oil filter.

(7) Fill the crankcase to the FULL mark on the dipstick with oil as specified in the Lubrication Order (paragraph 3-3).

(8) Operate the engine until the coolant reaches normal operating temperature.

CAUTION

Make sure that the proper side of the dipstick is checked.

(9) Check the oil level and add oil as necessary to bring it to the FULL level on the dipstick.

(10) Inspect the engine for oil leaks. Repair as necessary.

d. Oil Filter Service.

(1) Thoroughly clean the oil filter casings and the surrounding area.

(2) Remove drain plug (1, figure 3-2) and allow the oil to drain into a suitable container.

(3) Remove center screw (2) and sealing washer (3).

(4) Remove cap (4), gasket (5), spring (6), and filter element (7) from filter body (8). Discard gasket and filter element.

(5) Install replacement filter element (7) into filter body (8).

(6) Install spring (6), replacement gasket (5) and cap (4) and secure with washer (3) and center screw (2). Tighten center screw securely to prevent leaks.

(7) Install drain plug (1) and tighten securely.

e. Generators. The generator is a sealed unit and does not require lubrication.

Section III. PREVENTIVE MAINTENANCE CHECKS AND SERVICES

3-5. GENERAL.

To insure that the generator set is ready for operation at all times, it must be inspected systematically so that defects may be discovered and corrected before they result in serious damage or failure. Deficiencies discovered during operation of the unit shall be noted for future correction, to be made as soon as operation has ceased. Stop operation immediately if a deficiency is noted during operation which would damage the equipment. All deficiencies and shortcomings shall be recorded together with the corrective action on the applicable form at the earliest possible opportunity. Army and Navy users shall accomplish the necessary preventive maintenance services listed and described in paragraph 3-6. Air Force users shall refer to the applicable inspection manuals and work card sets in T.O. 35C2-3 Series for periodic requirements and Table 3-1 for detailed procedures. Marine Corps users should refer to the current issue of TM 11275-15/1.

3-6. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (ARMY AND NAVY).

a. Operator. Table 3-1 contains a tabulated listing of preventive maintenance checks and services (PMCS) which must be performed before, during, and after operation by the operator. The item numbers are listed consecutively and indicate the sequence of minimum requirements. Refer to table 3-1 for preventive maintenance checks and services.

b. Organizational Maintenance. Table 3-1.1 also contains a tabulated listing of preventive maintenance checks and services which must be performed by organizational maintenance personnel at weekly, monthly and semi-annual intervals. The item numbers are listed consecutively and indicate the sequence of minimum requirements. Refer to table 3-1.1 for preventive maintenance checks and services.

NOTE

Leakage definitions for operator/crew PMCS shall be classified as follows:

Class I	Seepage of fluid (as indicated by wetness or discoloration) not great enough to form drops.
Class II	Leakage of fluid great enough to form drops but not enough to cause drops to drip from item being checked/inspected.
Class III	Leakage of fluid great enough to form drops that fall from the item being checked/inspected.

CAUTION

Equipment operation is allowable with minor leakages (Class I or II). Of course, you must consider the fluid capacity in the item/system being checked/inspected. When in doubt, notify your supervisor.

When operating with Class I or Class II leaks, continue to check fluid levels as required in your PMCS.

Table 3-1. Operator/Crew Preventive Maintenance Checks and Services

B-Before Operation D-During Operation A-After Operation

Item No.	Interval			Item to be Inspected	Procedures: check for and have repaired or adjusted as necessary.	Equipment is not Ready/Available if:
	B	D	A			
1	●			Generator Set	Visually inspect the generator set for fuel, oil, hydraulic and coolant leaks (para 3-31 thru 3-34). Check for proper ground connections (para 2-3d).	Class III oil or fuel leakage is detected during inspection, or ground cable missing or not connected.
					Visually inspect the generator for missing, loose or damaged parts and hardware, and for unusual wear or deterioration.	
2	●			Cooling System	Check coolant level. Proper level is two inches below the overflow pipe. Add coolant as required.	
3	●			Fluid levels	Check fluid levels.	
				a. Hydraulic sump (MEP 104A only)	Check fluid level. Add fluid as required.	
				b. Cooling system	Check coolant level. Proper level is two inches below the overflow pipe. Add coolant as required.	
				c. Engine Oil Level	Check oil level. Add oil as necessary.	
				d. Batteries	Check electrolyte level.	
4	●			Control Panel	Indications shall be within specified limits.	
				a. Air cleaner condition indicator	Lights up to indicate a clogged air cleaner. Press-to-test (para 2-8c).	Air cleaner missing or unserviceable. Light remains on during operation.
				b. Frequency meter	50/60 Hz, 400 Hz (para 2-8d).	Frequency cannot be properly adjusted.
				c. Kilowatt meter	Indicates applied load. Not to exceed 100% (para 2-8e).	
				d. A.C. Ammeter	Indicates percentage of rated current. Not to exceed 100%.	No indication when load is applied.
				e. A.C. voltmeter	Indicates 120/208, or 240/416 volts.	Voltage cannot be properly adjusted.
				f. Battery charging ammeter	Normal indication 0 to +20 amps, depending on battery charging rate. Should read in green portion of scale during normal operation.	Ammeter does not indicate charging current.

Table 3-1. Operator/Crew Preventive Maintenance Checks and Services — Continued

B-Before Operation D-During Operation A-After Operation

Item No.	Interval B	Interval D	Interval A	Item to be Inspected	Procedures: check for and have repaired or adjusted as necessary.	Equipment is not Ready/Available if:
				g. Fault indicator panel	All lights out during operation. Check bulb operation with TEST or RESET switch on panel (para 3-113).	Fault light will not extinguish when switch is placed to TEST or RESET position, then released. All bulbs should be lit when switch is in TEST or RESET position.
				h. Engine oil pressure gage	Normal indication 20 to 55 psi (para 2-8al).	Pressure below 20 psi.
				i. Coolant temperature gage	Normal indication 170-200° F (para 2-8am).	Temperature exceeds 200° F.
				j. Fuel level gage	Indicates quantity of fuel in main tank (para 2-8ak).	
5	•		•	Day Tank	Drain water and sediment. NOTE In freezing weather, drain shortly after operation. Allow to drain until fuel runs clear.	
6	•	•		Main Fuel Tank	Drain water and sediment. NOTE In freezing weather, drain shortly after operation. Allow to drain until fuel runs clear.	
7				Fuel Filters and Strainers	Drain water and sediment. NOTE In freezing weather, drain shortly after operation. Allow to drain until fuel runs clear. NOTE DC CIRCUIT BREAKER must be in the closed position to perform steps 8, 9, 10. After completion of steps 8, 9 and 10, place DC CIRCUIT BREAKER in the open position.	
8			•	Main Fuel Tank	Fill fuel tank at completion of operation. (fig. 3-7, para 3-49).	
9			•	Battle short switch	Push in on lens housing. Light should illuminate. If not, replace bulb.	
10			•	Circuit Breaker switch	Push in on lens housing. Light should illuminate. If not, replace bulb.	

Table 3-1.1. Organizational Preventive Maintenance Checks and Services

W-Weekly (40 hours) M-Monthly (100 hours) S-Semiannual (500 hours) H-Hours (as indicated)

Item No.	Interval				Item to be Inspected	Procedures: Check for and have repaired or adjusted as necessary.	Equipment is not Ready/Available if:
	W	M	S	H			
1		•			Generator Set	Check entire unit for missing, loose, or damaged parts and hardware, and for unusual wear or deterioration.	
2		•			Batteries	Check electrolyte level. Check condition with a hydrometer. Add water as required (para 3-8).	
3		•			V-Belt	Inspect for worn, frayed, cracked, or oil-soaked belt. Check adjustment. If adjustment is required, adjust for a 1/2-inch deflection when belt is depressed at a point midway between alternator and water pump pulley (para 3-90).	
4		•			Fuel Filters	Replace filter elements every 100 hours (para 3-79, 3-81, and fig. 3-18 and 3-20).	
5				•	Hydraulic Sump	Drain and refill (para 3-97). (MEP-104A Precise Sets only)	
6				•	Hydraulic Filter	Replace fiter (para 3-97). (MEP-104A Precise Sets only)	
7				•	Hydraulic Actuator Screen	Clean filter (para 3-98). (MEP 104A Precise Sets only)	
8				•	Breather and Breather Tube	Inspect for damage. Clean breather and breather tube at oil change interval (para 3-103).	
9				•	Engine Oil	Change every 300 hours or 6 months; in absence of the Army Oil Analysis Program (AOAP).	
10				•	Oil Filters	Change every 300 hours or 6 months.	
11				•	Air Cleaner	This unit is equipped with an air filter condition indicator light that will indicate when filter element needs cleaning. Clean element when necessary as indicated by light (para 3-24).	Air cleaner missing or unserviceable.

Pages 3-8A and 3-8B deleted.

TABLE 3-1.1. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES--continued

INTERVAL W-WEEKLY (40 HOURS) S-SEMIANNUAL (500 HOURS)
M-MONTHLY (100 HOURS) H-HOURS (AS INDICATED)

ITEM NO.	W	M	S	H	ITEM TO BE INSPECTED	PROCEDURES Check for and nave repaired or adjusted as necessary.	EQUIPMENT IS NOT READY/AVAILABLE IF:
4		●			Day Tank	Drain water and sediment. NOTE In freezing weather, drain shortly after operation. Allow to drain until fuel runs clear.	
5		●			Generator Set	Check entire unit for missing, loose, or damaged parts and hardware, and for unusual wear or deterioration.	
6		●			Batteries	Check electrolyte level. Check condition with a hydrometer. Add water as required (para 3-8).	
7		●			V-Belt	Inspect for worn, frayed, cracked, or oil-soaked belt. Check adjustment. If adjustment is required, adjust for a 1/2-inch deflection when belt is depressed at a point midway between alternator and water pump pulley (para 3-90).	
8		●			Fuel Filters	Replace filter elements every 100 hours (para 3-79, 3-81, and fig. 3-18 and 3-20).	
9				●	Hydraulic Sump	Drain and refill (para 3-97). (MEP-104A Precise Sets only)	
10				●	Hydraulic Filter	Replace filter (para 3-97). (MEP-104A Precise Sets only)	
11				●	Hydraulic Actuator Screen	Clean filter (para 3-98). (MEP-104A Precise Sets only)	

TABLE 3-1.1. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES--continued

INTERVAL W-WEEKLY (40 HOURS) S-SEMIANNUAL (500 HOURS)
M-MONTHLY (100 HOURS) H-HOURS (AS INDICATED)

ITEM NO.	W	M	S	H	ITEM TO BE INSPECTED	PROCEDURES Check for and have repaired or adjusted as necessary.	EQUIPMENT IS NOT READY/AVAILABLE IF:
12				●	Breather and Breather tube	Inspect for damage. Clean breather and breather tube at oil change interval (para 3-103).	
13				●	Engine Oil	Change every 300 hours or 6 months.	
14				●	Oil Filters	Change every 300 hours or 6 months.	
15				●	Air Cleaner	This unit is equipped with an air filter condition indicator light that will indicate when filter element needs cleaning. Clean element when necessary as indicated by light (para 3-24).	

Section IV. OPERATOR'S MAINTENANCE

3-7. GENERAL.

The instructions in this section are published for the information and guidance of personnel operating the generator set. Deficiencies noted during inspection which are beyond the maintenance scope of the operator shall be reported to higher level maintenance.

3-8. BATTERIES (figure 1-1).

a. Inspection.

(1) Inspect batteries for cracked or broken cases, corrosion on terminal posts, damaged or frayed cables and loose connections.

(2) Refer to paragraph 3-65 and slide battery tray out from compartment.

(3) Check electrolyte level at eight hour intervals. More often under high temperature conditions.

b. Service.

(1) Remove corrosion from battery terminals and apply a light coat of grease.

(2) Maintain electrolyte level to slots in filler wells.

3-9. SLAVE RECEPTACLES (figure 1-1).

Inspect the slave receptacles for loose mounting, loose connections, loose or damaged weather covers and other visible damage.

3-10. BREATHER TUBE, EXHAUST PIPE AND MUFFLER (figure 3-32 and figure 3-33).

a. Inspect breather tube for cracks breaks, insecure mounting and clogging.

b. Inspect exhaust pipe and muffler for insecure mounting, cracks, and obstructions.

3-11. CONVENIENCE RECEPTACLES AND CIRCUIT BREAKER (figure 1-2).

Inspect convenience receptacles and circuit breaker for insecure mounting, cracks, loose connections, damaged leads and other visible damage.

3-12. PLATE AND SLEEVE ASSEMBLY (figure 1-2).

a. Inspect sleeve for tears, deterioration, and missing draw string.

b. Check plate for dents, cracks, and illegible markings.

3-13. PARALLELING RECEPTACLES (figure 1-2).

a. Inspect paralleling receptacles for insecure mounting, corrosion, and damage.

b. Check electrical leads for loose connection, frayed insulation, and evidence of shorting.

3-14. AC VOLTMETER (7, figure 2-7).

a. Inspection. Inspect ac voltemeter for cracked or broken glass, insecure mounting, bent indicator, corrosion or other damage.

b. Adjustment. With the generator set shut off, rotate the voltmeter "zero" adjusting screw until the indicator points to zero.

3-15. KILOWATT (PERCENT POWER) METER (4, figure 2-7).

a. Inspection. Inspect the kilowatt meter for cracked, or broken glass, insecure mounting, bent indicator, corrosion and other damage.

b. Adjustment. With the generator set shut off, rotate the kilowatt meter adjusting screw until the indicator is in the zero position.

3-16. AC (PERCENT RATED CURRENT) AMMETER (6, figure 2-7).

a. Inspection. Inspect ac ammeter for cracked or broken glass, insecure mounting, corrosion, loose connections, bent indicator and other damage.

b. Adjustment. With the generator set shut off, rotate the ammeter adjusting screw until the indicator is in the "zero" position.

3-17. FREQUENCY METER (3, figure 2-7).

Inspect the frequency meter for cracked or broken glass, insecure mounting, corrosion, loose connections, bent indicator and other damage.

3-18. CONTROL PANEL SWITCHES.

Inspect BATTLE SHORT switch (22, figure 2-7), operations switch (26), VOLTAGE SENSING switch (27), PANEL LIGHTS switch (28), circuit breaker switch (30), START-RUN-STOP switch (32), and ENGINE PRIMER switch (33) for cracks, corroded terminals, loose connections and insecure mounting.

3-19. CONTROL PANEL GAUGES.

Inspect FUEL LEVEL gauge (36, figure 2-7), OIL PRESSURE gauge (37) and COOLANT TEMPERATURE gauge (38) for cracked or broken glass, corrosion, insecure mounting, loose connections, bent indicator and other damage.

3-20. RUNNING TIME METER (34, figure 2-7).

Inspect running time meter for broken glass, insecure mounting, loose connections, corrosion and other damage.

3-21. BATTERY CHARGING AMMETER (35, figure 2-7).

Inspect BATTERY CHARGING AMMETER for broken glass, insecure mounting, loose connections, corrosion and damage.

3-22. GENERATOR SET HOUSING.

a. Inspect generator set doors, panels and covers for dents, corrosion, defective paint, and other damage.

b. Check that all hinges and latches operate properly.

c. Inspect for loose, damaged, or missing hardware.

3-23. WIRING HARNESSES.

Inspect engine, generator, and interconnecting wiring harnesses for loose connection, frayed insulation, or other damage.

3-24. AIR CLEANER ASSEMBLY.

a. Inspection.

(1) Inspect air cleaner housing for dents, defective paint, corrosion, missing hardware and other damage.

(2) Inspect air cleaner condition switch for insecure mounting and evidence of shorting or other damage.

b. Service.

(1) Remove nuts, lockwashers, screws and retainer (figure 3-3).

(2) Carefully remove dirty filter element from housing.

CAUTION

Do not clean air cleaner filter element in gasoline or other petroleum solvents.

(3) Soak and agitate filter element for 15 minutes in a solution of warm water and mild detergent.

CAUTION

Do not use compressed air to dry a wet filter element.

(4) Rinse filter element until clean and air dry for approximately 24 hours.

(5) The filter element may also be cleaned with low pressure (40 psig MAX), filtered compressed air.

(6) Place a light behind the cleaned filter element and check for holes, tears or other defects. Replace if defective.

(7) Clean interior of housing and install filter element.

(8) Install retainer, screws, lockwashers, and nuts.

3-25. DAY TANK ASSEMBLY.

a. Inspection. Inspect day tank assembly (figure 1-2) for cracks, leaks, insecure mounting, loose or damaged fuel lines, and loose electrical connections.

b. Service. Before and after each operation period, open the valve and allow any sediment and water to drain into a suitable container. When clean fuel begins to emerge, close the drain valve. For complete draining of the tank, leave valve open until no more fuel will drain out.

3-26. FUEL FILTER AND STRAINER ASSEMBLY.

a. Inspection. Inspect fuel filter and strainer assembly for insecure mounting, cracks, dents, leaks, loose fuel lines and other discrepencies.

b. Service.

(1) Open the drain cocks on the fuel strainer housing and the fuel filter housing and allow the fuel to drain into a suitable container.

(2) Remove center screw (1, figure 3-4) and washer (2) to remove fuel filter housing (3) and gasket (4). Discard gasket.

(3) Withdraw filter element (5) from housing and discard.

(4) Do not remove drain cock (6) unless replacement is necessary.

(5) Remove cup nut (7) and sealing washer (8) to remove strainer housing (9) and gasket (10).

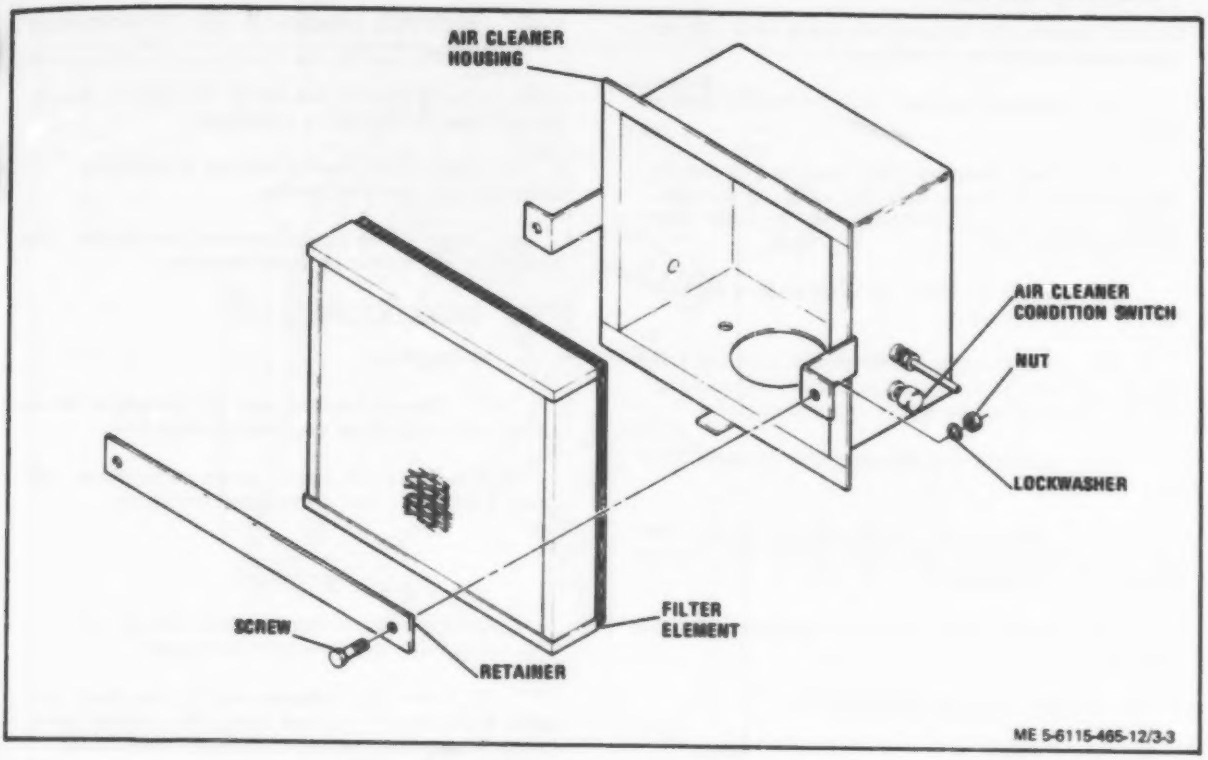
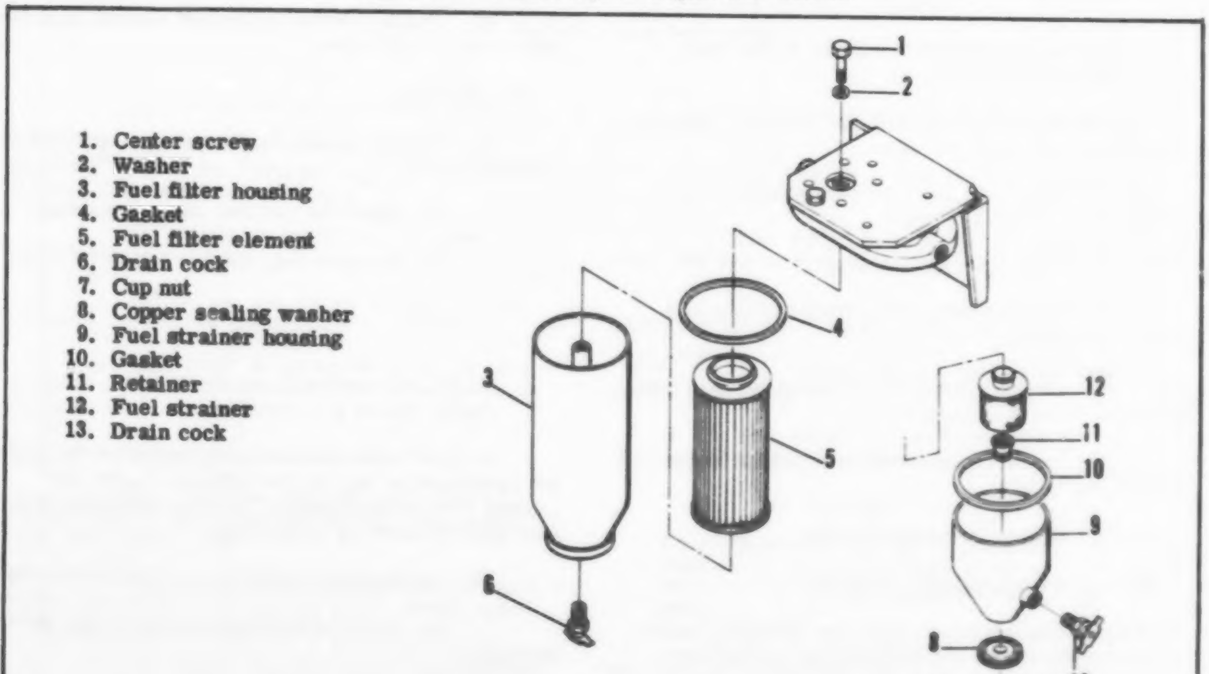

AIR CLEANER HOUSING
AIR CLEANER CONDITION SWITCH
NUT
LOCKWASHER
FILTER ELEMENT
SCREW
RETAINER
ME 5-6115-465-12/3-3

Figure 3-3. Servicing the Engine Air Cleaner


1
2
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1. Center screw
2. Washer
3. Fuel filter housing
4. Gasket
5. Fuel filter element
6. Drain cock
7. Cup nut
8. Copper sealing washer
9. Fuel strainer housing
10. Gasket
11. Retainer
12. Fuel strainer
13. Drain cock

Figure 3-4. Servicing Fuel Strainer and Filter Housing

ME 5-6115-465-12/3-4

Discard gasket. Do not remove drain cock (13) unless replacement is necessary.

(6) Remove retainer (11) to remove strainer (12).

(7) Clean strainer (12), housings (3 and 9), and attaching hardware with dry cleaning solvent (Federal Specification P-D-680) and dry with filtered compressed air.

(8) Install strainer (12) and secure with retainer (11) finger tight.

(9) Install replacement gasket (10) and housing (9) and secure with sealing washer (8) and cup nut (7). Tighten nut securely to prevent leaks.

(10) Install replacement filter element (5) into housing (3).

(11) Install replacement gasket (4) and housing (3) and washer (2) and center screw (1). Torque screw to 17 ± 2 lb-ft.

(12) Close drain cocks on strainer and filter housings.

3-27. START AID ASSEMBLY.

a. Inspection.

NOTE

Start aid assembly is located on day tank assembly (figure 1-2).

Inspect start aid assembly for damage, insecure mounting, and loose fittings.

b. Service. Replace an unserviceable or empty ether tank as follows:

(1) Open ether tank bracket.

(2) Unscrew ether tank from the solenoid valve and discard.

(3) Inspect threads of replacement tank and solenoid valve for damage.

(4) Screw replacement tank onto solenoid valve hand tight.

(5) Close ether tank bracket.

3-28. FUEL TRANSFER PUMPS.

Inspect fuel transfer pumps for damage, leaks, insecure mountings and loose electrical and fuel connections.

3-29. RADIATOR GRILLE.

Inspect the radiator grille for dirt, cracks, dents, insecure mounting, corrosion and other damage.

3-30. SHUTTER ASSEMBLY AND THERMOSTAT (figure 3-24).

a. Check shutter assembly for bent or dented louvers and for insecure mounting.

b. Check that control linkage is securely mounted and operates freely.

c. Inspect thermostat housing for cracks, leaks, excessive corrosion or other damage.

3-31. RADIATOR (figure 1-1).

a. Inspection.

(1) Check radiator core air passages for obstructions to air flow and bent cooling fins.

(2) Check for leaks, loose connections, insecure mounting and excessive corrosion.

WARNING

Always remove the radiator cap slowly to permit any pressure to escape.

(3) Open the radiator cap access door, remove the radiator cap and check the coolant level. Check for accumulations of rust or scale in the radiator.

(4) Check radiator hoses and coolant lines for deterioration and leaks.

b. Service.

(1) To add coolant to the radiator, proceed as follows:

(a) Open the radiator cap access door.

(b) Remove the radiator cap.

CAUTION

Do not add coolant to an overheated engine unless it is running.

(c) Add coolant, as specified on the coolant specification tag, to the radiator. Leave the coolant level approximately 2 inches below the overflow pipe to allow for expansion.

(2) To flush the radiator, proceed as follows:

(a) Remove the radiator cap to facilitate drainage.

(b) Open the coolant drain cock (17, figure 3-24) at the bottom of the shutter control thermostat housing and allow the coolant to drain into a suitable container.

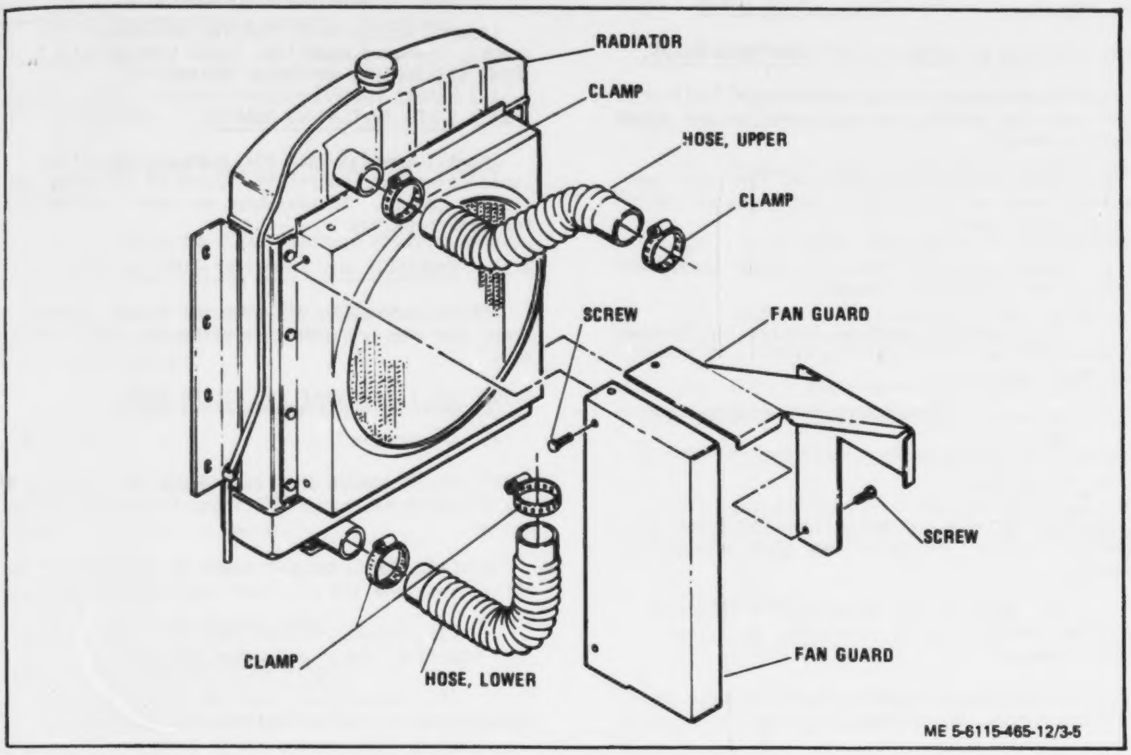


Figure 3-5. Radiator Hose Replacement

(c) Close the coolant drain valve.

(d) Fill the radiator with clean water and install the radiator cap; approved cleaning compounds may be used.

(e) Refer to paragraph 2-10 and start the engine.

(f) Allow the engine to operate until normal operating temperature is reached.

(g) Refer to paragraph 2-11 and stop the engine. Open the coolant drain valve to drain the water.

(h) Close the coolant drain valve.

(i) Fill the radiator with coolant as specified in table 2-1 and attach a tag specifying the coolant used.

(j) Refer to paragraph 2-10 and start the engine and allow it to operate until normal operating temperature is reached.

(k) Check coolant level. Add coolant as necessary.

(3) To replace radiator hoses, proceed as follows:

(a) Remove screws and fan guard (figure 3-5).

(b) Refer to step (2) (b) above and drain the radiator.

(c) Loosen clamps and remove defective radiator hose (figure 3-5).

(d) Clean radiator and engine hose connection points.

(e) Remove clamps from defective hose and place on replacement.

CAUTION

Do not push hose too far in on water pump outlet pipe and orient clamp so that it does not scrape against fan belt.

(f) Push replacement hose onto engine and radiator connectors and tighten clamps.

(g) Install fan guard and screws.

best copy available

(h) Refer to step (2)(i) above and service the radiator.

3-32. HYDRAULIC ACTUATOR (MEP-104A Sets Only).

a. Inspect hydraulic actuator unit for insecure mounting, dents, cracks, corrosion and other visible damage.

b. Check electrical connectors for loose connection, bent or broken pins, and signs of shorting or other damage.

c. Check hydraulic lines for loose connections, leaks, and other damage.

d. Check governor control linkage for freedom of movement, worn ball joints, cracks, corrosion and other damage.

3-33. HYDRAULIC SUMP AND FILTER (MEP-104A SETS ONLY).

a. Inspection.

(1) Inspect hydraulic sump for insecure mounting, cracks, corrosion, and other visible damage.

(2) Check filter assembly for insecure mounting, dents, cracks, corrosion, and other visible damage.

(3) Check hydraulic lines for loose connections, leaks, and damage.

b. Service.

(1) Clean filler cap and surrounding area.

(2) Remove filler cap and check oil level as indicated on dipstick.

(3) Refer to figure 3-1 and add oil to proper level on dipstick.

(4) Install filler cap.

3-34. ENGINE ASSEMBLY.

a. Inspection.

(1) Inspect the engine assembly for fuel, oil, and water leaks. Check for accumulations of dirt. Check for cracks, corrosion and other damage.

(2) Check for damage, insecure mounting, or missing parts or accessories.

b. Service.

(1) Keep the external areas of the engine and accessories clean and free of oil and grease.

(2) Check cylinder block drain plugs and radiator drain cock for evidence of leaking.

3-35. V-BELT.

Inspect the v-belt frequently for indications of wear, deterioration, and oil soaking.

3-36. BATTERY CHARGING ALTERNATOR.

Inspect the battery charging alternator for cracks, insecure mounting, loose connections, signs of shorting and other damage.

3-37. SPEED SWITCH AND ADAPTER.

Inspect speed switch for insecure mounting, loose connector, corrosion, signs of shorting and visible damage. Inspect boot on reset switch S1 for deterioration.

3-38. HYDRAULIC OIL PUMP (MEP-104A SETS ONLY).

Inspect hydraulic oil pump for cracks, leaks, loose fittings, insecure mounting and other damage.

3-39. OIL LEVEL GAUGE AND FILLER TUBE.

a. Inspection.

(1) Inspect oil level gauge for legibility of markings, loose fittings, bends and other damage.

(2) Check for oil leaks at the base of the filler tube and the oil level gauge tube.

(3) Inspect filler tube for cracks, insecure mounting, dents and other damage.

(4) Inspect oil seal in filler cap for excessive wear, deterioration, and damage.

b. Replacement.

(1) Replace oil level gauge by removing and installing a new one.

(2) To replace oil filler cap, remove the cap and disconnect the captive chain. Connect the captive chain to a new cap and install the cap onto the filler tube.

3-40. STARTER ASSEMBLY.

Inspect starter assembly for insecure mounting, loose electrical connections, cracks, and damage to the starter solenoid.

3-41. OIL PRESSURE TRANSMITTER.

Inspect the oil pressure transmitter for insecure mounting, leaks, loose electrical connections, cracks, and other damage.

3-42. LUBE OIL FILTER.

Inspect the lube oil filter for cracks, dents, and leaks.

3-43. SECONDARY FUEL FILTER.

a. Inspection. Inspect the secondary fuel filter for leaks, cracks, breaks, and other damage.

b. Service.

(1) Open the drain valve on bottom of day tank assembly (figure 1-2) and allow the fuel to drain into a suitable container.

(2) Open drain cock (1, figure 3-6) and allow fuel to drain into a suitable container.

(3) Remove center screw assembly (2) and washer (3) to remove housing (6) and gasket (7). Discard gasket.

(4) Remove bleeder plug (4) from center screw (5).

(5) Withdraw filter element (8) from housing and discard.

(6) Clean parts in dry cleaning solvent (Federal Specification P-D-680) and dry with filtered compressed air.

(7) Insert replacement filter element (8) into housing.

(8) Install replacement gasket (7) and secure housing (6) with washer (3) and center screw (5). Torque screw 17 ± 2 lbs-ft.

(9) Close drain cock (1) and fill day tank (paragraph 2-10).

(10) Install bleeder plug (4).

3-44. FUEL INJECTION PUMP.

Inspect fuel injection pump for insecure mounting, cracks, leaks, loose connections and other damage.

3-45. FAN ASSEMBLY.

Inspect fan assembly for bent blades, insecure mounting, cracked mounting bracket, and other damage.

3-46. WATER PUMP ASSEMBLY.

Inspect water pump assembly for leaks, cracks, insecure mounting, loose coolant lines and hoses and other damage.

3-47. COOLANT TEMPERATURE TRANSMITTER.

Inspect coolant temperature transmitter for insecure mounting, cracks, loose connections and leaks.

3-48. OIL PAN ASSEMBLY.

a. Inspect oil pan for dents, loose hardware, and oil leaks.

b. Check oil heater coolant lines for leaks, loose fittings, pinching, cracks and other damage.

c. Inspect drain hose for loose connections, deterioration, tears, and other damage.

3-49. MAIN FUEL TANK.

a. Inspection.

(1) Inspect for insecure mounting, dents, leaks, cracks and other damage.

(2) Inspect filler cap for damage and corrosion.

(3) Check filler cap gasket for damage or deterioration.

(4) Inspect filler hose for leaks, deterioration, loose connections and other damage.

(5) Check drain valve and captive cap for leaks, damage, and corrosion.

(6) Check fuel lines for loose connections.

(7) Inspect fuel level sensor for loose electrical connections, insecure mounting, corrosion and other damage.

b. Servicing.

(1) Filler Cap.

(a) Unscrew filler cap (figure 3-7) and disconnect captive chain.

(b) Inspect filler cap gasket for damage and deterioration. Replace gasket if deficiencies are present.

(c) Clean cap in an approved solvent and dry thoroughly.

(d) Inspect vent valve in filler cap for plugging.

(e) Check cap for cracks, corrosion, and other damage. Replace cap if damage is present.

(f) Check captive chain for corrosion and cracked or broken links. Replace chain if damage is noted.

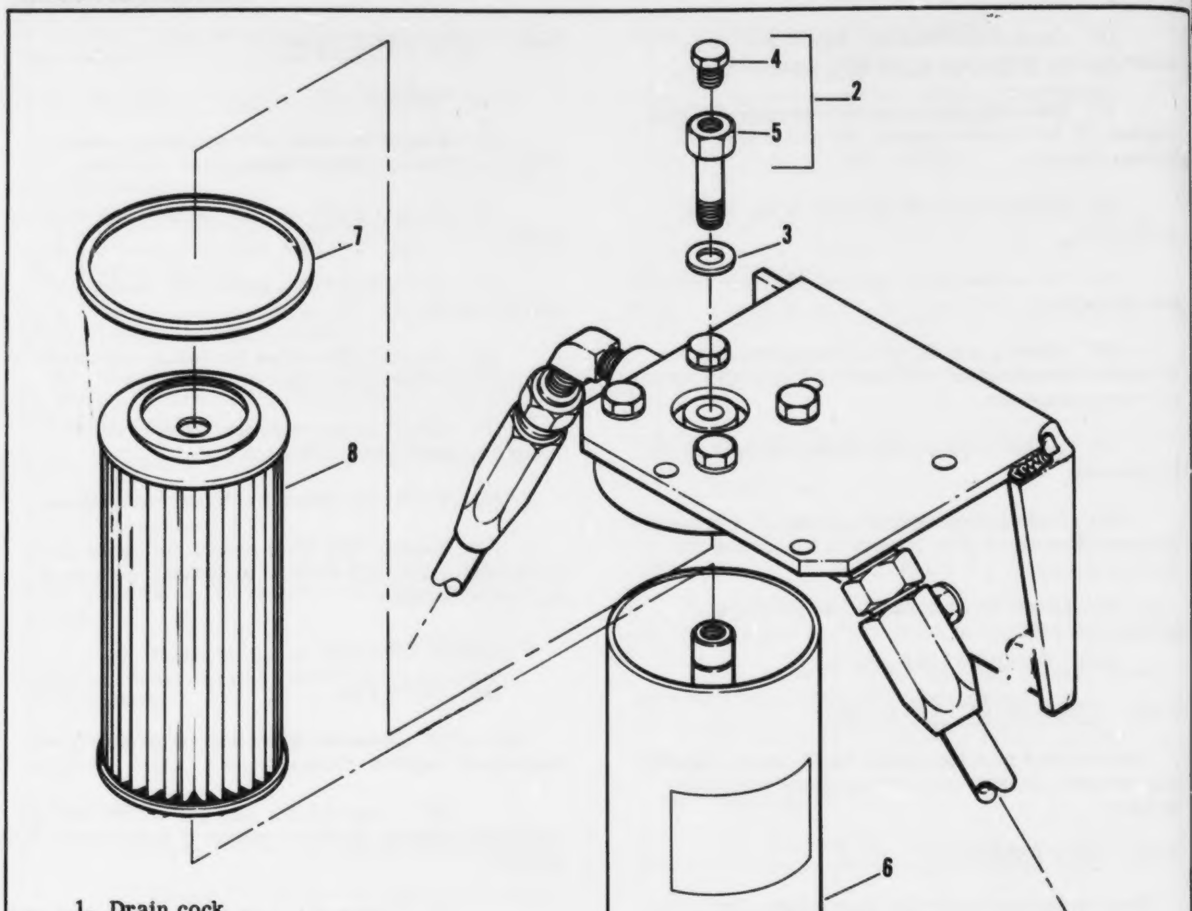
(g) Install gasket onto filler cap.

(h) Connect captive chain to filler neck and install filler cap.

(2) Main Fuel Tank.

(a) Remove captive cap from drain valve (figure 3-7).

(b) Install auxiliary fuel line onto drain line and position its free end to drain over board into a suitable container.


4
2
5
3
7
8
6
1
ME 5-6115-465-12/3-6

1. Drain cock
2. Center screw assembly
3. Washer
4. Bleeder plug
5. Center screw
6. Housing
7. Gasket
8. Filter element

Figure 3-6. Servicing Secondary Fuel Filter

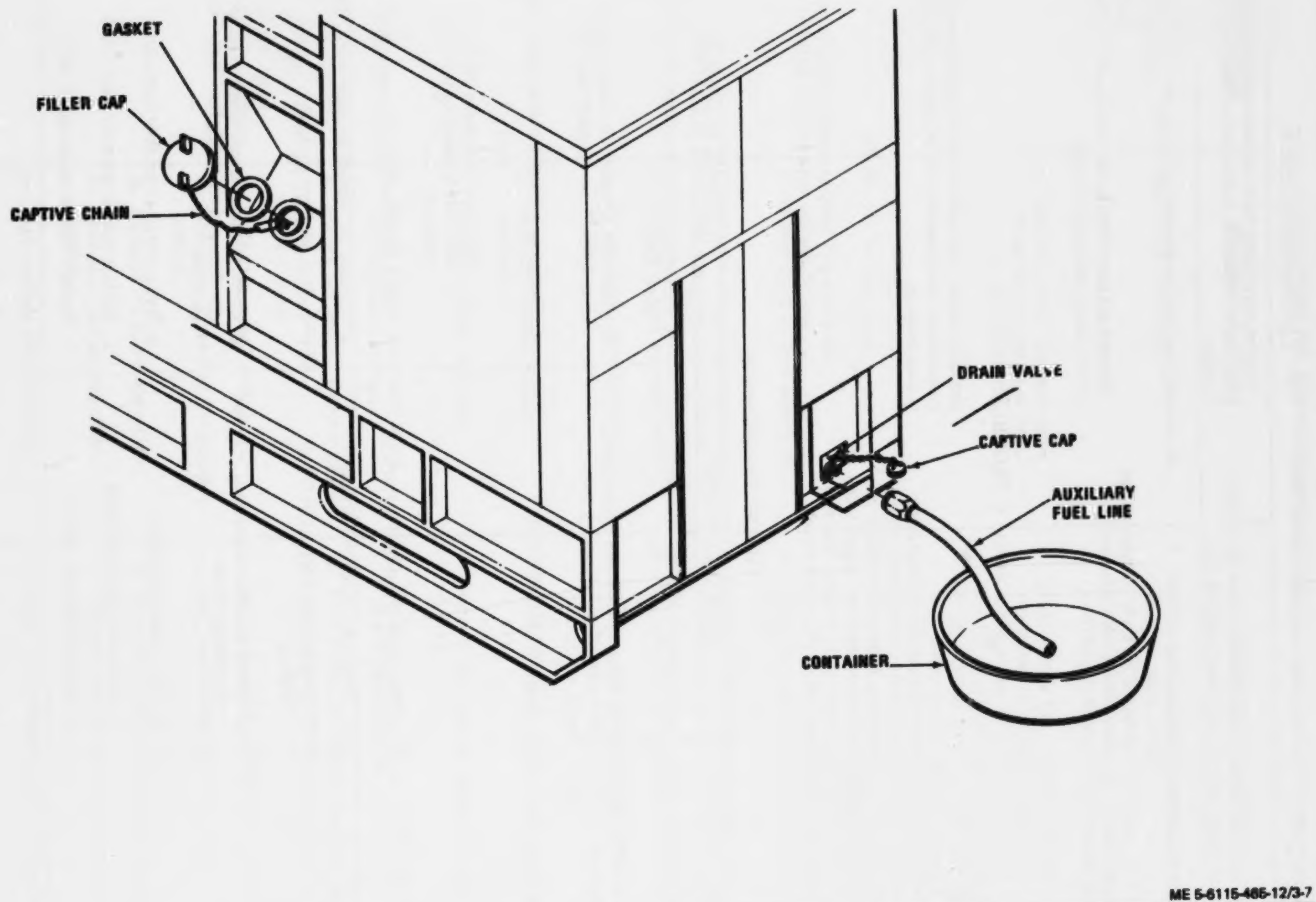

GASKET
FILLER CAP
CAPTIVE CHAIN
DRAIN VALVE
CAPTIVE CAP
AUXILIARY FUEL LINE
CONTAINER
ME 5-6115-465-12/3-7

Figure 3-7. Main Fuel Tank Inspection and Service

(c) Open drain valve and allow sediment to drain from fuel tank.

(d) When all sediment has drained, close drain valve. Remove auxiliary fuel line and install captive cap.

(e) Add fuel to tank as required.

(f) For complete draining of the tank, complete steps (a) through (c) above and leave drain valve open until no more fuel will drain out.

3-50. PARALLELING CABLE.

Inspect paralleling cable for damaged connectors and pins, frayed insulation, indications of shorting, and other damage.

3-51. AUXILIARY FUEL LINE.

Inspect auxiliary fuel line for deterioration, damaged connectors, leaks and other damage.

Section V. TROUBLESHOOTING

3-52. GENERAL.

This section provides information useful in diagnosing and correcting unsatisfactory operation or failure of the generator set and its components. Malfunctions which may occur are listed in table 3-2. Each malfunction stated is followed by a list of probable causes of the trouble. The corrective action recommended is described opposite each probable cause. Any malfunction beyond the scope of organizational maintenance shall be reported to higher level of maintenance.

NOTE

Air Force and Navy users may perform maintenance within the scope of their abilities.

Table 3-2. Troubleshooting

MALFUNCTION	PROBABLE CAUSE	CORRECTIVE ACTION
1. Engine fails to crank.	a. Improper starting procedure.	a. Perform starting procedure as outlined in para. 2-10.
	b. Loose or corroded battery cable terminals and battery post.	b. Clean battery post. Clean and tighten battery cable terminals (para. 3-65).
	c. Discharged batteries.	c. Charge or replace batteries (para. 3-65). NOTE Use slave receptacle (SR1) when extra cranking power is required.
	d. Improperly installed batteries.	d. Install batteries correctly (para. 3-65).
	e. Defective DC circuit breaker.	e. Replace DC circuit breaker (para. 3-115).
	f. Defective START-RUN-STOP switch.	f. Replace START-RUN-STOP switch (para. 3-112).
	g. Loose electrical connection or break in starting circuit.	g. Check starting circuit wiring. Replace any damaged wires. Tighten loose connections.
	h. Worn starter brushes.	h. Replace starter brushes (para. 3-67).
	i. Defective starter solenoid.	i. Replace starter solenoid (para. 3-67).
	j. Defective starter motor.	j. Replace starter motor (para. 3-67).

Table 3-2. Troubleshooting (Cont)

MALFUNCTION	PROBABLE CAUSE	CORRECTIVE ACTION
2. Engine cranks but fails to start	a. Improper starting procedure.	a. Perform starting procedure as outlined in para. 2-10.
	b. Low or no fuel supply.	b. Service fuel tank (para. 2-1), or use auxiliary fuel supply (para. 2-3).
	c. Water in fuel, contaminated or incorrect grade of fuel.	c. Drain entire fuel system. Service with clean fuel of proper grade (para. 3-49). Service fuel filters (para. 3-26 and 3-43). Drain day tank assembly (para. 3-25). Drain fuel tank and service with clean fuel of proper grade (para. 3-49).
	d. Air in fuel lines.	d. Tighten any loose fuel supply line connections [para. 3-83].
	e. Obstruction in fuel supply line.	e. Clean or replace fuel supply line (para. 3-83).
	f. Defective day tank fuel level and low fuel cutoff switch.	f. Replace switch (para. 3-74).
	g. Defective fuel solenoid valve.	g. Replace fuel solenoid valve (para. 3-75).
	h. Clogged fuel strainer or filters.	h. Service fuel strainer and filter assembly (para. 3-26). Service secondary fuel filter (para. 3-43).
	i. Defective nozzle holder assembly.	i. Replace nozzle holder assembly (para. 3-82).
	j. Dirty air filter element.	j. Service air cleaner assembly (para. 3-24).
	k. Speed switch not reset after overspeed shutdown.	k. Depress reset button on back of overspeed switch (para. 3-69).
3. Engine starts correctly, but stops when START-RUN-STOP switch is released.	a. Switch not held in START position long enough.	a. Hold switch in START position until engine oil pressure reaches 20 PSI (para. 2-10).
	b. Defective speed switch.	b. Replace speed switch (para. 3-69).
	c. Defective START-RUN-STOP switch.	c. Replace switch (para. 3-112).
	d. Clogged oil filter assembly.	d. Service oil filter assembly (para. 3-4).
	e. Defective low oil pressure switch.	e. Replace low oil pressure switch (para. 3-73).
	f. High coolant temperature.	f. Refer to malfunction 11 of this table.

Table 3-2. Troubleshooting (Cont)

MALFUNCTION	PROBABLE CAUSE	CORRECTIVE ACTION
3. Engine starts correctly, but stops when START-RUN-STOP switch is released. (continued)	g. Low fuel level in day tank.	g. Check main tank fuel level. Check transfer pumps for proper operation. Replace if necessary (para. 3-78). Check fuel solenoid valve for proper operation. Replace if defective (para. 3-75). Check day tank fuel level and low fuel cut-off switch for proper operation. Replace if necessary (para. 3-74).
4. Engine stops suddenly	a. Protective device tripped.	a. Check fault indicator for malfunction indication. Refer to the appropriate maintenance section.
	b. Fuel supply exhausted.	b. Service fuel tank (para. 3-49).
	c. Air lock in fuel supply line.	c. Bleed fuel system (para. 3-25, 3-26, 3-49). Tighten any loose fuel line connections (para. 3-83).
	d. Obstruction in fuel supply line.	d. Clean or replace fuel supply line (para. 3-83).
	e. Water in fuel.	e. Drain main fuel tank (para. 3-49), fuel filters (para. 3-43, 3-46) and day tank (para. 3-25). Service fuel system with clean fuel (para. 3-49).
5. Engine runs erratically or misfires.	a. Improper grade or contaminated fuel.	a. Drain entire system. Service with clean fuel of proper grade (para. 3-49). Service fuel filters (para. 3-26 and 3-43).
	b. Dirty air cleaner.	b. Service air cleaner (para. 3-24).
	c. Obstruction in fuel supply line.	c. Clean or replace fuel supply line (para. 3-83).
	d. Valves out of adjustment.	d. Adjust valve tappet clearance (para. 3-109).
	e. Dirty nozzles.	e. Clean and replace defective nozzles.
6. Engine does not develop full power	a. One or more cylinders misfiring.	a. Refer to malfunction 5 of this table.
	b. Exhaust pipe or muffler restricted.	b. Clean or replace exhaust pipe or muffler (para. 3-102).
7. Engine knocks.	a. Engine overheated.	a. Refer to malfunction 11 of this table.
	b. Low lube oil level.	b. Check oil level. Add oil if necessary. (Lubrication Order, para. 3-3.)
	c. Valve tappet clearance too great.	c. Adjust valve tappet clearance (para. 3-109).
	d. Injector nozzle broken.	d. Replace injector nozzle (para. 3-82).

Table 3-2. Troubleshooting (Cont)

MALFUNCTION	PROBABLE CAUSE	CORRECTIVE ACTION
7. Engine knocks (Continued)	e. Improper grade of fuel or water in fuel.	e. Drain main fuel tank (para. 3-49), fuel filters (para. 3-26, 3-43), and day tank (para. 3-25). Service system with clean fuel (para. 3-49).
8. Black smoke in exhaust.	a. Improper grade of fuel.	a. Drain main fuel tank (para. 3-49), fuel filters (para. 3-26, 3-43), and day tank (para. 3-25). Service system with clean fuel (para. 3-49).
	b. Dirty injector nozzles.	b. Clean or replace injector nozzles (para. 3-82).
	c. Dirty air cleaner.	c. Service air cleaner (para. 3-24).
	d. Generator set over-loaded.	d. Reduce load to rated level.
9. Blue or white smoke in exhaust	a. Improper grade of fuel.	a. Drain main fuel tank (para. 3-49), fuel filters (para. 3-26, 3-43) and day tank (para. 3-25). Service system with clean fuel.
	b. Engine operating temperature too low due to defective thermostat.	b. Replace thermostat (para. 3-93).
	c. Crankcase oil level too high.	c. Drain crankcase and refill to proper level (para. 3-4).
	d. Defective nozzle holder assembly.	d. Replace nozzle holder assembly (para. 3-82).
	e. Improper valve tappet clearance.	e. Adjust valve tappet clearance (para. 3-109).
10. Low oil pressure	a. Low oil level.	a. Add oil to proper level on dipstick (para. 3-3).
	b. Defective oil pressure gauge.	b. Replace oil pressure gauge (para. 3-112).
	c. Defective oil pressure transmitter.	c. Replace oil pressure transmitter (para. 3-72).
	d. Clogged oil filters.	d. Service oil filter (para. 3-4).
	e. Improper viscosity oil.	e. Draink crankcase and refill with oil of proper viscosity (lubrication order, para. 3-3).
11. Engine overheating	a. Low coolant level.	a. Check coolant level. Add coolant as necessary (para. 3-31).
	b. V-belt broken or out of adjustment.	b. Adjust or replace v-belt (para. 3-90).
	c. Defective thermostat.	c. Replace thermostat (para. 3-93).

Table 3-2. Troubleshooting (Cont)

MALFUNCTION	PROBABLE CAUSE	CORRECTIVE ACTION
11. Engine overheating	d. Defective or improperly adjusted shutter and controls.	d. Adjust or replace shutter and control assembly (para. 3-89).
	e. Rust or scale clogging radiator.	e. Replace radiator (para. 3-88).
	f. Radiator air passages clogged.	f. Clean radiator air passages (para. 3-31).
	g. Collapsed radiator hoses.	g. Replace radiator hoses (para. 3-31).
	h. Defective water pump.	h. Replace water pump assembly (para. 3-92).
	i. Restricted exhaust pipe or muffler.	i. Clean or replace exhaust pipe or muffler (para. 3-102).
12. Engine coolant temperature too low	a. Thermostat stuck open.	a. Replace thermostat (para. 3-93).
	b. Improperly adjusted or defective shutter or control linkage and thermostat.	b. Adjust or replace shutter assembly (para. 3-89). Replace defective control linkage or thermostat (para. 3-87).
	c. Defective temperature transmitter.	c. Replace temperature transmitter (para. 3-70).
	d. Defective coolant temperature gauge.	d. Replace coolant temperature gauge (para. 3-112).
13. Battery charging ammeter shows no charge when batteries are low or discharged	a. Defecitve alternator fuse.	a. Replace fuse in back of alternator (para. 3-68, figure 3-13).
	b. Improperly adjusted alternator.	b. Adjust alternator (para. 3-68).
	c. V-belt is out of adjustment or broken.	c. Adjust or replace v-belt (para. 3-90).
	d. Defective alternator.	d. Replace alternator (para. 3-68).
	e. Open wire or loose connection in charging circuit.	e. Check charging circuit wiring. Replace broken wires and tighten loose connections.
	f. Batteries dry.	f. Refill battery cells with distilled water (para. 3-65).
14. Battery charging ammeter shows excessive charging after prolonged operation.	a. Improperly adjusted alternator.	a. Adjust alternator (para. 3-68).
	b. Defective batteries.	b. Replace batteries (para. 3-65).
	c. Defective alternator.	c. Replace alternator (para. 3-68).
	d. Short in charging circuit.	d. Check charging circuit. Repair or replace shorted wiring.
	e. Defective battery charging ammeter.	e. Replace battery charging ammeter (para. 3-112).

Table 3-2. Troubleshooting (Cont)

MALFUNCTION	PROBABLE CAUSE	CORRECTIVE ACTION
15. AC voltmeter does not indicate voltage	a. Defective VOLT-AMP transfer switch.	a. Replace switch (para. 3-112).
	b. Defective voltage adjust rheostat.	b. Replace defective voltage adjust rheostat (para. 3-112).
	c. Defective ac voltmeter.	c. Replace ac voltmeter (para. 3-112).
16. AC voltmeter indicates voltage, but frequency meter is off scale.	a. Engine speed too slow.	a. Adjust frequency rheostat (Precise Sets Only) (para.2-10). Increase engine speed with manual speed control (Utility Sets Only) (para. 2-10).
	b. Defective frequency meter.	b. Replace frequency meter (para. 3-112).
	c. Defective frequency transducer.	c. Replace frequency transducer (para. 3-112).
17. AC voltage fluctuates.	a. Loose electrical connection.	a. Inspect electrical system and make any repairs necessary (figures FO-1 and FO-2).
	b. Defective VOLT-AMPS selector switch.	b. Replace VOLT-AMPS SELECTOR switch (para. 3-112).
	c. Defective voltage adjust rheostat.	c. Replace voltage adjust rheostat (para. 3-112).
	d. Defective ac voltmeter.	d. Replace ac voltmeter (para. 3-112).
18. Frequency fluctuates.	a. Erratic engine operation.	a. Refer to malfunction 5 of this table.
	b. Defective frequency adjust rheostat (Class 1 sets only).	b. Replace frequency adjust rheostat (para. 3-112).
	c. Defective frequency meter.	c. Replace frequency meter (para. 3-112).
	d. Defective frequency transducer.	d. Replace frequency transducer (para. 3-112).
19. Main AC contactor (CB2) will not close	a. Defective circuit breaker switch.	a. Inspect, test S3. Replace if defective (para 3-112u).
	b. Defective Main Load Contactor (figure 3-43A).	
	c. Defective reverse power relay K15	b. Disconnect electrical connector (P&J41 FO-1, sht 4) from Main load contactor (CB2). Start generator set. While holding circuit breaker switch (S3) in closed position, using a voltmeter, test for 28 VDC at J41, receptacle A(+) and test CB2 (para 3-121). Replace if defective. If 28 VDC is not present, notify higher level maintenance.
	d. Defective undervoltage relay K11 (Precise Sets Only).	
	e. Defective under-frequency relay K12.	
	f. Defective permissive paralleling relay K16.	
	g. Defective contactor switch S3.	

Section VI. FIELD EXPEDIENT REPAIRS

3-53. GENERAL.

Organizational maintenance troubles may occur while the generator set is operating in the field where supplies and repair parts are not available and normal corrective action cannot be performed. When this condition exists, the following expedient repairs may be used in emergencies, upon the decision of the unit commander. Equipment so repaired must be removed from operation and properly repaired as soon as conditions permit.

3-54. FUEL IS NOT STRAINED.

TROUBLE	EXPEDIENT REMEDY
Fuel strainer and filters defective.	Remove strainer and filters and operate the generator set until replacements are obtained.

3-55. HOUSING FILLED WITH SMOKE.

TROUBLE	EXPEDIENT REMEDY
Defective exhaust pipe.	Operate the generator set with defective exhaust pipe until a replacement is obtained.

3-56. ENGINE OVERHEATING.

TROUBLE	EXPEDIENT REMEDY
Shutter control assembly not operational.	Manually open shutter with lever or install a temporary brace to hold shutters open.
Defective thermostat (stuck closed).	Remove thermostat and operate the generator set without one until a replacement can be obtained.
Loss of oil pressure.	Check oil level and add, if necessary. If oil supply is adequate, stop the engine, and check for defective oil pressure gauge. If the gauge is proven to be defective, continue to operate the engine. If oil supply and gauge are satisfactory, check for defective oil pump.

3-57. LOSS OF COOLANT.

TROUBLE	EXPEDIENT REMEDY
Leaking coolant line or radiator hose.	Tightly wrap the leaking area with plastic electricians tape.
Leaking coolant line or radiator hose (Cont)	If necessary, stop the engine and drain the coolant to perform the taping. Check the taped area frequently while the generator set is operating until a replacement hose is obtained.
Leaking radiator.	Remove radiator cap to release pressure in cooling system. Liberally apply epoxy, tar, putty, or any other insoluable substance to the leaking area. Operate the generator set until a replacement radiator is obtained, adding coolant as necessary.
Leaking water pump.	Loosen the radiator cap to prevent pressure build-up i the cooling system. Continu operation, adding coolant as necessary to maintain coolant level above top of radiator core, until a replacement water pump is obtained

3-58. BATTERY CHARGING AMMETER SHOWS NO CHARGE.

TROUBLE	EXPEDIENT REMEDY
Battery charging alternator.	Continue engine operation wi defective alternator until re placement is obtained or un engine can be shutdown and repairs performed.

3-59. LOSS OF FREQUENCY CONTROL (TACTICA PRECISE SETS ONLY).

TROUBLE	EXPEDIENT REMEDY
Governor fails to operate properly.	Use manual speed control to control frequency until necessary repairs can be made. For changeover procedures see paragraph 3-59

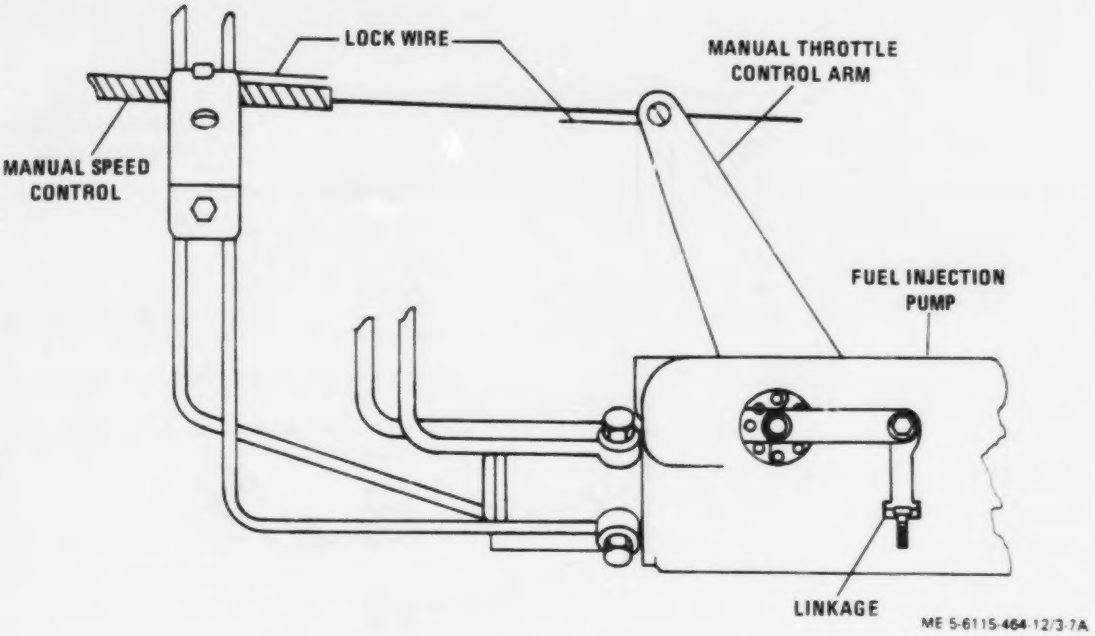


Figure 3-7A. Emergency Conversion Connections

a. Changeover Procedures. The following paragraphs contain procedures for changing the configuration of a tactical precise generator set to a tactical utility set, and procedures for restoring the set to a tactical precise configuration.

(1) Tactical Precise to Tactical Utility. Disconnect the wiring harness from the special relay box, located on the relay table. Install the shorting plug, attached to the special relay box, into the connector on the special relay box. Disconnect the linkage between the actuator and the fuel injection pump (figure 3-7A). Remove the lockwire. Adjust the manual speed control and manual throttle control arm so that with the control knob fully in, the manual throttle control arm is at the low idle setting.

(2) Tactical Utility to Tactical Precise. With the manual speed control knob fully in, install a lockwire (figure 3-7A) on the manual throttle control arm so that the arm is in the approximate position shown in figure 3-7A. Remove the shorting plug from the receptacle on the special relay box. Connect the wiring harness to the special relay box receptacle. Do not detach the shorting plug from the special relay box. Connect the linkage between the hydraulic actuator and the fuel injection pump.

NOTE

Desired speeds must be obtained by trial and error adjustments of linkage, position of control arm, and governor control unit adjustments.

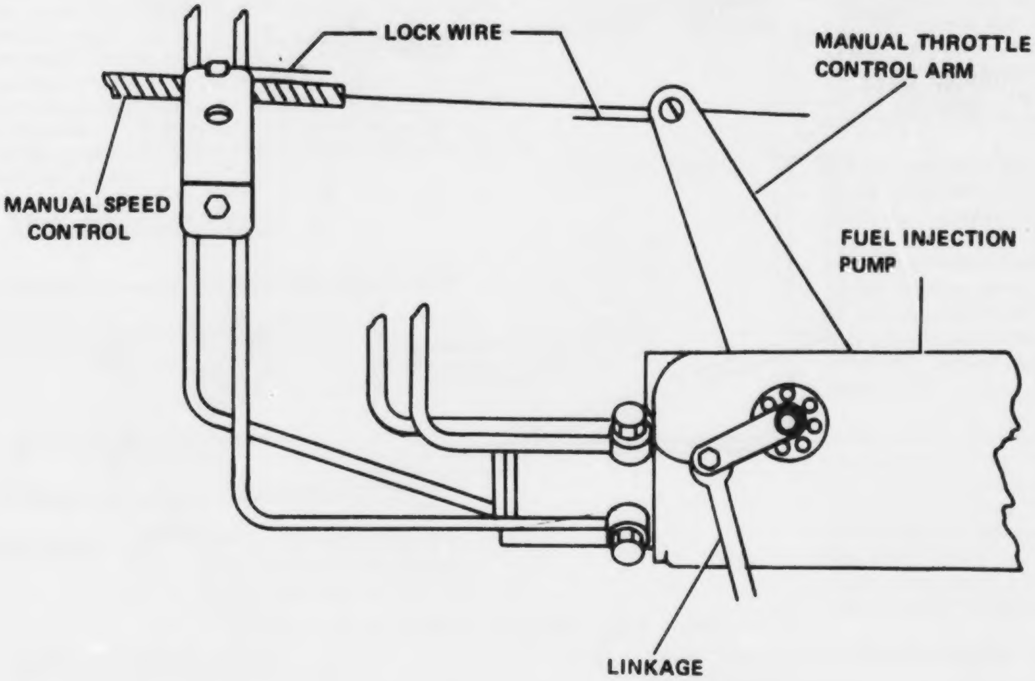

LOCK WIRE
MANUAL THROTTLE CONTROL ARM
MANUAL SPEED CONTROL
FUEL INJECTION PUMP
LINKAGE

Figure 3-7B. Emergency Conversion Connections (Effective with serial no. RZ70001)

Section VII. ELECTROMAGNETIC INTERFERENCE SUPPRESSION

3-60. GENERAL METHODS USED TO OBTAIN PROPER SUPPRESSION.

Essentially, suppression is obtained by providing a path to ground for stray currents. The methods used include shielding high frequency wires, grounding the frame with bonding straps and using capacitors, inductors and resistors.

3-61. INTERFERENCE SUPPRESSION COMPONENTS.

a. Fuel transfer pumps. The fuel transfer pumps are equipped with interference suppression components as an integral part.

b. Effective with precise units, serial number RZ70001 and KZ00001 thru KZ07252, additional suppression components have been included at the main load terminal and as part of the static exciter.

3-62. REPLACEMENT OF ELECTROMAGNETIC INTERFERENCE COMPONENTS.

a. For replacement of electromagnetic interference suppression components in the fuel transfer pumps, refer to paragraph 3-78 and replace fuel transfer pumps as a unit.

b. Replacement of the interference components at main load terminal and static exciter shall be referred to higher maintenance level.

3-63. TESTING OF INTERFERENCE SUPPRESSION COMPONENTS.

If electromagnetic interference is suspected, refer to higher maintenance level for testing.

Section VIII. ORGANIZATIONAL MAINTENANCE OF THE ENGINE ELECTRICAL SYSTEM

3-64. GENERAL.

This section contains organizational maintenance instructions for the engine electrical system. Electrical power for starting the generator set engine is supplied by two 12 volt, 100 amp-hour, lead-acid type batteries connected in series . A slave receptacle facilitates external connection to the batteries. The starting motor is a 24 volt, heavy duty unit equipped with a positive indexing drive and an overrun type clutch. An integral solenoid switch is connected to the clutch shift lever by linkage and engages the clutch pinion gear with the flywheel and holds it in mesh during engine cranking. A 28-volt, continous duty, alternator with integral voltage regulator and diode rectifier supplies electrical power for recharging the batteries after cranking. A manually reset speed switch driven by the camshaft provides sequence control of circuits during starting and also provides automatic shutdown in the event of engine overspeeding. Coolant temperature is read through a temperature transmitter. An overtemperature switch provides automatic shutdown in the event that coolant temperature exceeds 220 ± 3° F. The engine lube oil pressure is read through a pressure transmitter. A low oil pressure switch provides automatic shutdown in the event that oil pressure falls below 20 ± 2 psig. The day tank is equipped with a double float switch which controls the fuel solenoid valve and provides automatic shutdown when only enough fuel remains for one minute of operation. The components of the engine electrical system are connected electrically through the engine wiring harness.

3-65. BATTERIES.

a. Installation.

(1) Refer to paragraph 3-8 and service the batteries.

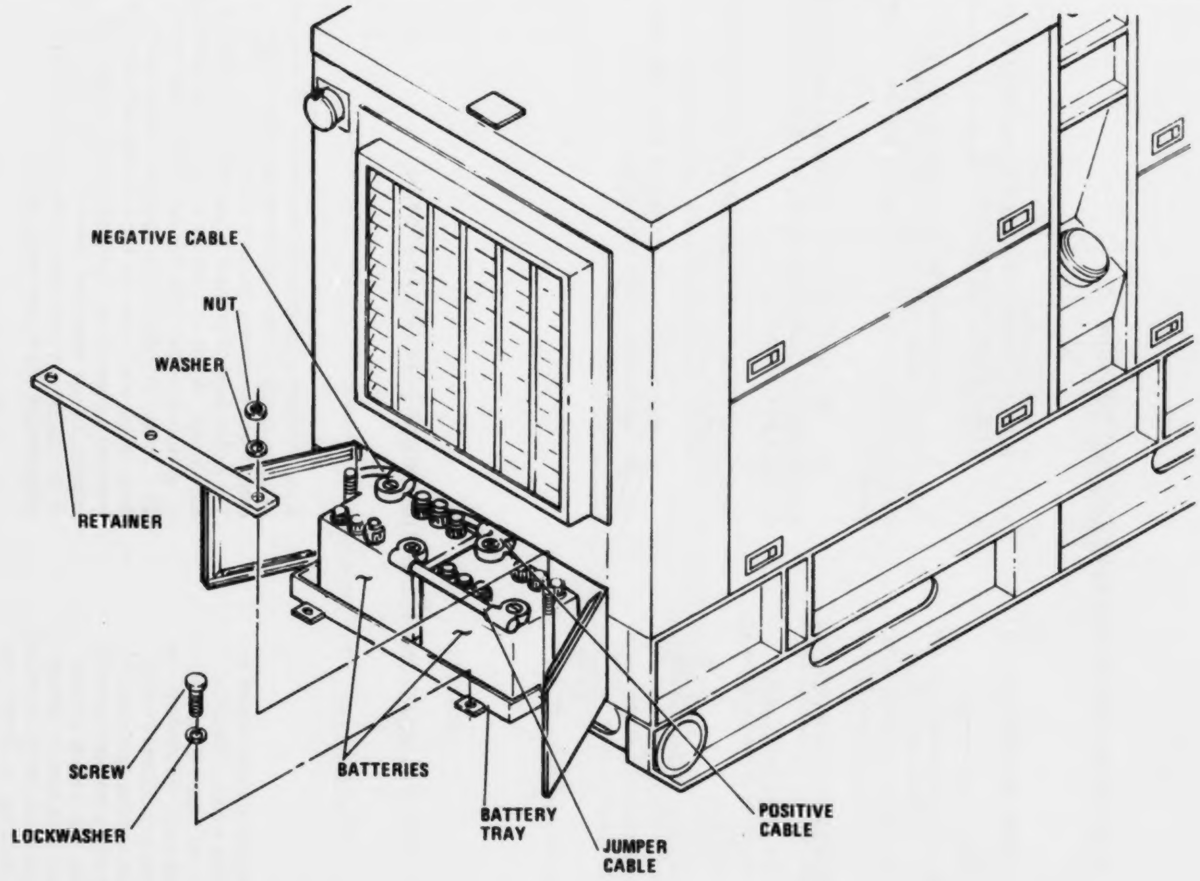

NEGATIVE CABLE
NUT
WASHER
RETAINER
SCREW
LOCKWASHER
BATTERIES
BATTERY TRAY
JUMPER CABLE
POSITIVE CABLE

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Figure 3-8. Battery Installation

WARNING

Battery electrolyte contains sulfuric acid which can cause severe burns. Handle batteries with care. If electrolyte should contact the skin or clothing, rinse immediately with clean water.

(2) Install batteries and connect as shown in figure 3-8.

NOTE

When installing battery cables, always connect ground (negative) cable last.

(3) Install retainer and secure with washers and nuts.

(4) Apply an approved corrosion preventive compound to battery posts and cable terminals.

b. Replacement.

(1) Removal.

(a) Remove battery tray retaining screws and washers (figure 3-8) and slide battery tray out from compartment.

(b) Remove nuts, washers, and retainer (figure 3-8).

(c) Remove battery cables.

NOTE

When removing battery cables, always disconnect ground (negative) cable first.

(d) Remove batteries from battery tray.

(2) Installation. Refer to subparagraph a. above for installation instructions.

c. Testing.

(1) Test specific gravity of electrolyte in each battery cell with a hydrometer. Refer to table 3-3 for specific gravity temperature corrections. Refer to table 3-4 for state of charge with specific gravity corrected to 80°F.

WARNING

Batteries generate hydrogen, a highly volatile gas, during charging. There shall be no smoking or open flame in the vicinity.

(2) Recharge or replace batteries as necessary.

Table 3-3. Specific Gravity Temperature Corrections

Temperature °F	Correction Factor
+120	+0.016
+115	+0.014
+110	+0.012
+105	+0.010
+100	+0.008
+95	+0.006
+90	+0.004
+85	+0.002
+80	0
+75	-0.002
+70	-0.004
+65	-0.006
+60	-0.008
+55	-0.010
+50	-0.012
+45	-0.014
+40	-0.016
+35	-0.018
+30	-0.020
+25	-0.022
+20	-0.024
+15	-0.026
+10	-0.028
+5	-0.030
0	-0.032
-5	-0.034
-10	-0.036
-15	-0.038
-20	-0.040

Table 3-4. State of Charge With Specific Gravity Corrected to 80°F

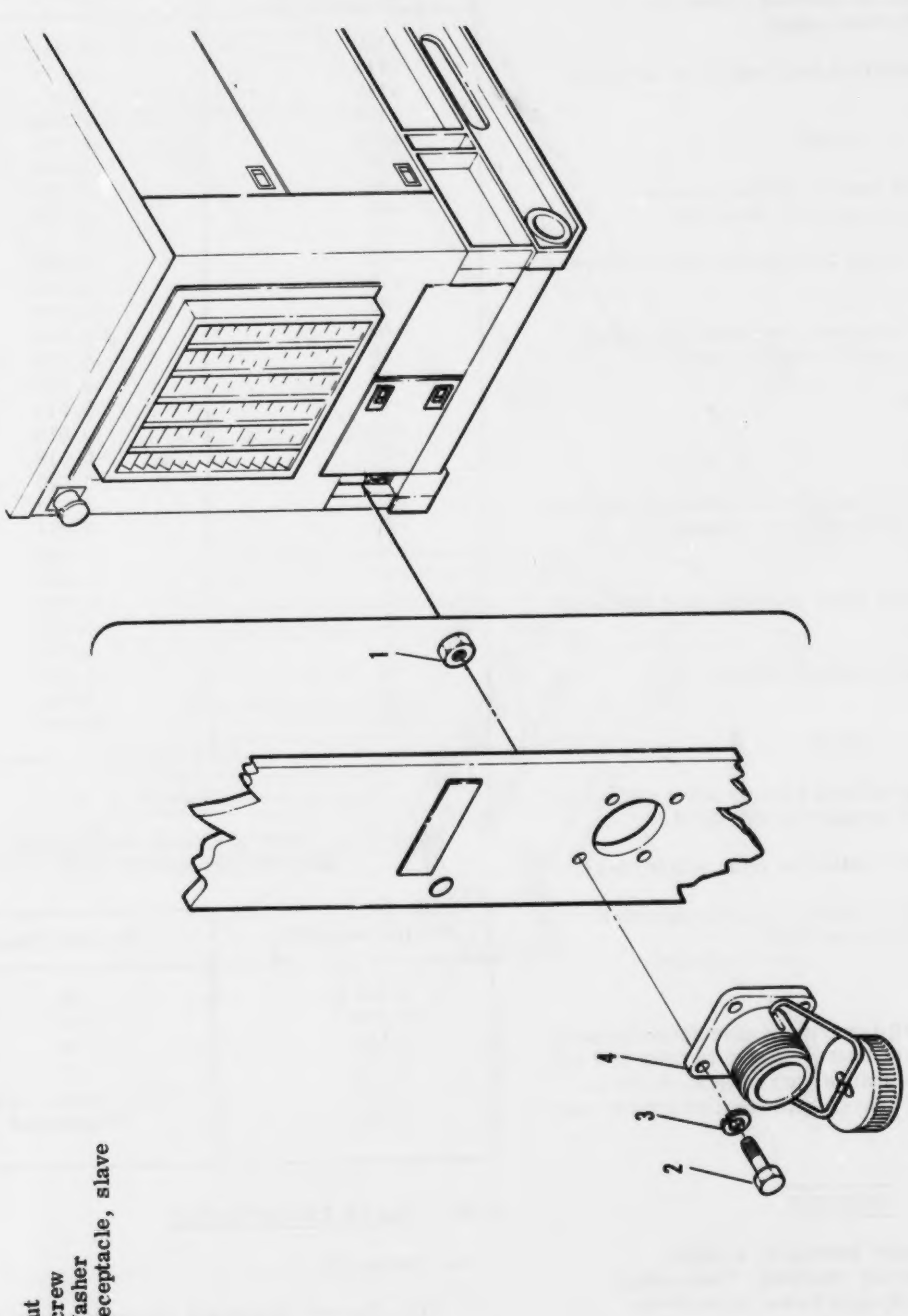
Specific Gravity	Percent Charge
1.280	100
1.250	75
1.220	50
1.190	25
1.160	Little useful capacity
1.130	Discharged

3-66. SLAVE RECEPTACLE.

a. Removal.

(1) Tag and disconnect electrical leads to the slave receptacle.

(2) Remove nuts (1, figure 3-9), screws (2) and washers (3) to remove slave receptacle (4).


ME 5-6115-465-12/3-9
1
2
3
4

1. Nut
2. Screw
3. Washer
4. Receptacle, slave

Figure 3-9. Slave Receptacle, Removal and Installation

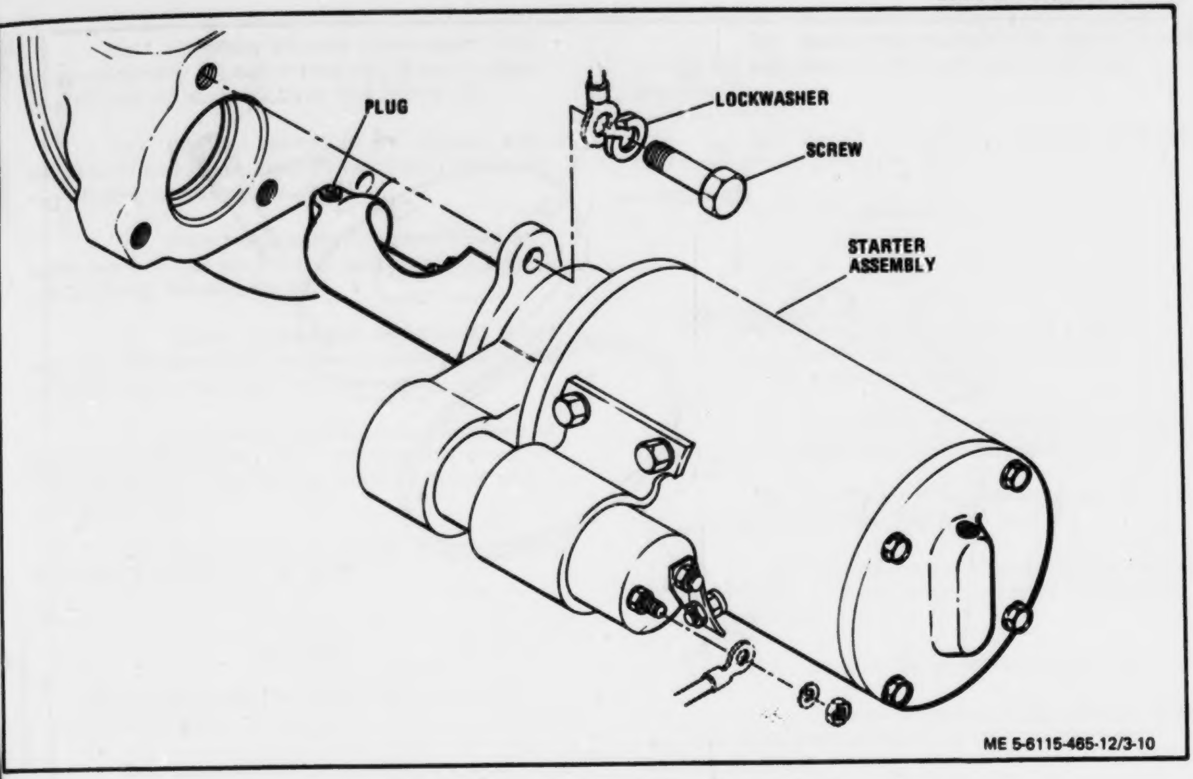


Figure 3-10. Starter Assembly, Removal

b. Cleaning and Inspection.

(1) Clean receptacle with filtered compressed air and a soft bristle brush.

(2) Clean receptacle box with a clean, lint-free cloth moistened with an approved solvent.

(3) Inspect receptacle for bent or broken pins, stripped terminal threads, corrosion or other damage.

(4) Inspect wiring of receptacle for frayed or deteriorated insulation, evidence of shorting and other damage.

(5) Inspect receptacle box for dents, corrosion and other damage.

(6) Replace any parts damaged beyond simple repair.

c. Installation. Install slave receptacle in reverse order of removal procedures.

3-67. STARTER ASSEMBLY.

a. Removal.

(1) Tag and disconnect electrical leads to starter assembly (figure 3-10).

(2) Remove three bolts and lockwashers to remove starter from bell housing.

b. Cleaning and Inspection.

(1) Clean starter assembly with a clean, lint-free cloth moistened with an approved solvent.

(2) Inspect starter assembly for cracks, corrosion, evidence of shorting and other damage.

(3) Inspect solenoid assembly for cracks, corrosion, evidence of shorting and other damage.

(4) Inspect all threaded parts for stripped or damaged threads.

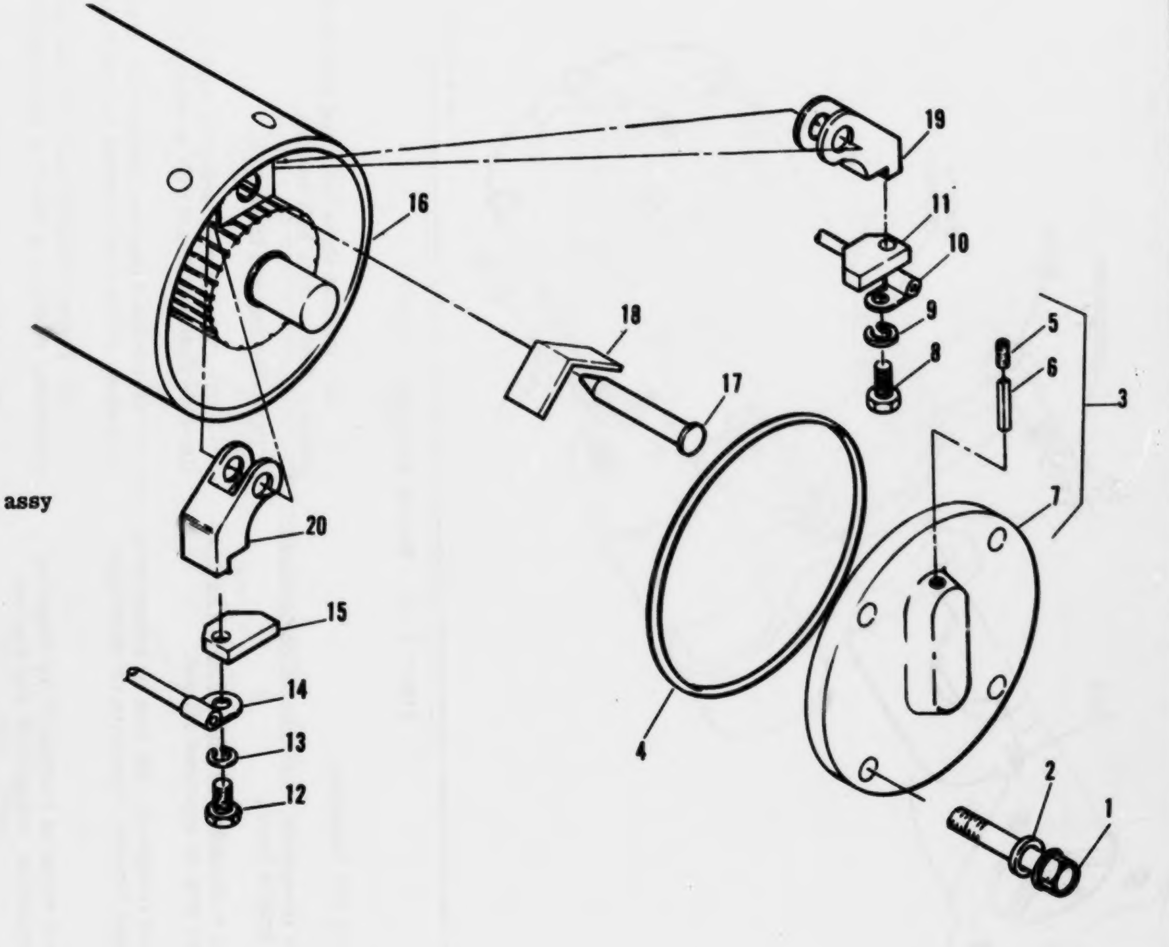
c. Repair.

(1) Brush replacement.

NOTE

It is not necessary to remove the starter assembly from the engine to replace the brushes.

(a) Remove screws (1, figure 3-11), and lockwashers (2)



1. Screw
2. Lockwasher
3. Commutator end frame assy
4. O-ring
5. Pipe plug
6. Oil wick
7. End frame
8. Screw
9. Lockwasher
10. Electrical lead
11. Brush
12. Screw
13. Lockwasher
14. Electrical lead
15. Brush
16. Starter assy
17. Brushholder pin
18. Brushholder spring
19. Brushholder
20. Brushholder

ME 5-6115-465-12/3-11

Figure 3-11. Starter Brushes Replacement

(b) Carefully remove commutator end frame assembly (3) and o-ring (4). Remove pipe plug (5) and oil wick (6) from end frame (7).

(c) Remove screws (8 and 12) and lockwashers (9 and 13) to remove electrical leads (10 and 14) and brushes (11 and 15).

(d) Remove brushholder pin (17) to remove brushholder spring (18) and brushholders (19 and 20) from brush support.

(e) Clean commutator end frame, brush support, brushholders, and brushholder springs in an approved solvent and dry thoroughly.

(f) Soak oil wick in a small container of approved cleaning solvent to remove oil. Remove from container, squeeze out excess solvent and allow to air dry.

(g) Measure brush length. Replace brushes if length is 3/8 inch or less.

CAUTION

Use extreme care to avoid enlarging commutator slots.

(h) Inspect starter armature commutator slots for thrown solder. Remove any found with a narrow blunt instrument.

(i) Check bronze bushing in commutator end frame and armature shaft for deep wear patterns, scoring, or other damage. Replace starter assembly if damage exists.

(j) Check brushholders and brush support for corrosion, cracks, breaks, and other damage. Replace any defective parts.

(k) Inspect electrical leads and visible starter assembly wiring for burned insulation, bare wires and rub marks. Replace starter assembly if damage is present.

(l) Check all attaching hardware for stripped, crossed or otherwise damaged threads. Replace any damaged or defective parts.

(m) Install brushholders (19 and 20) and spring (18) and secure with pin (17).

(n) Install brushes (11 and 15) and electrical leads (10 and 14) and secure with lockwashers (9 and 13) and screws (8 and 12).

CAUTION

Use care when installing end frame to avoid damaging the bronze armature shaft bushing.

(o) Install commutator end frame (7) and o-ring (4) and secure with lockwashers (2) and screws (1).

(p) Install oil wick (6), saturate with oil and secure with pipe plug (5).

(2) Solenoid replacement.

NOTE

It is not necessary to remove the starter assembly from the generator set to replace the solenoid assembly.

(a) Remove nut (1, figure 3-12) and lockwasher (2) to disconnect electrical lead (3).

(b) Remove nut (4), lockwasher (5), nut (6), lockwasher (7) and terminal lead (8).

(c) Loosen clamp (9) and remove screws (10) to remove solenoid frame assembly (11). Remove sleeve (12).

(d) Remove drive housing plug (13).

(e) Remove retaining ring (14) and lever pin (15) to remove plunger assembly (16) from starter assembly (17).

(f) Remove retaining ring (18) to separate spring retainer (19), spring (20), seal (21), seal retainer (22), and spring retainer (23) from plunger (24).

(g) Clean solenoid frame assembly with filtered compressed air and a soft bristle brush.

(h) Using an ohmmeter, check for continuity between solenoid frame assembly terminals. Replace entire solenoid assembly if discontinuity is noted.

(i) Clean all other parts in an approved solvent and dry thoroughly.

(j) Inspect plunger for cracks, corrosion, and other damage.

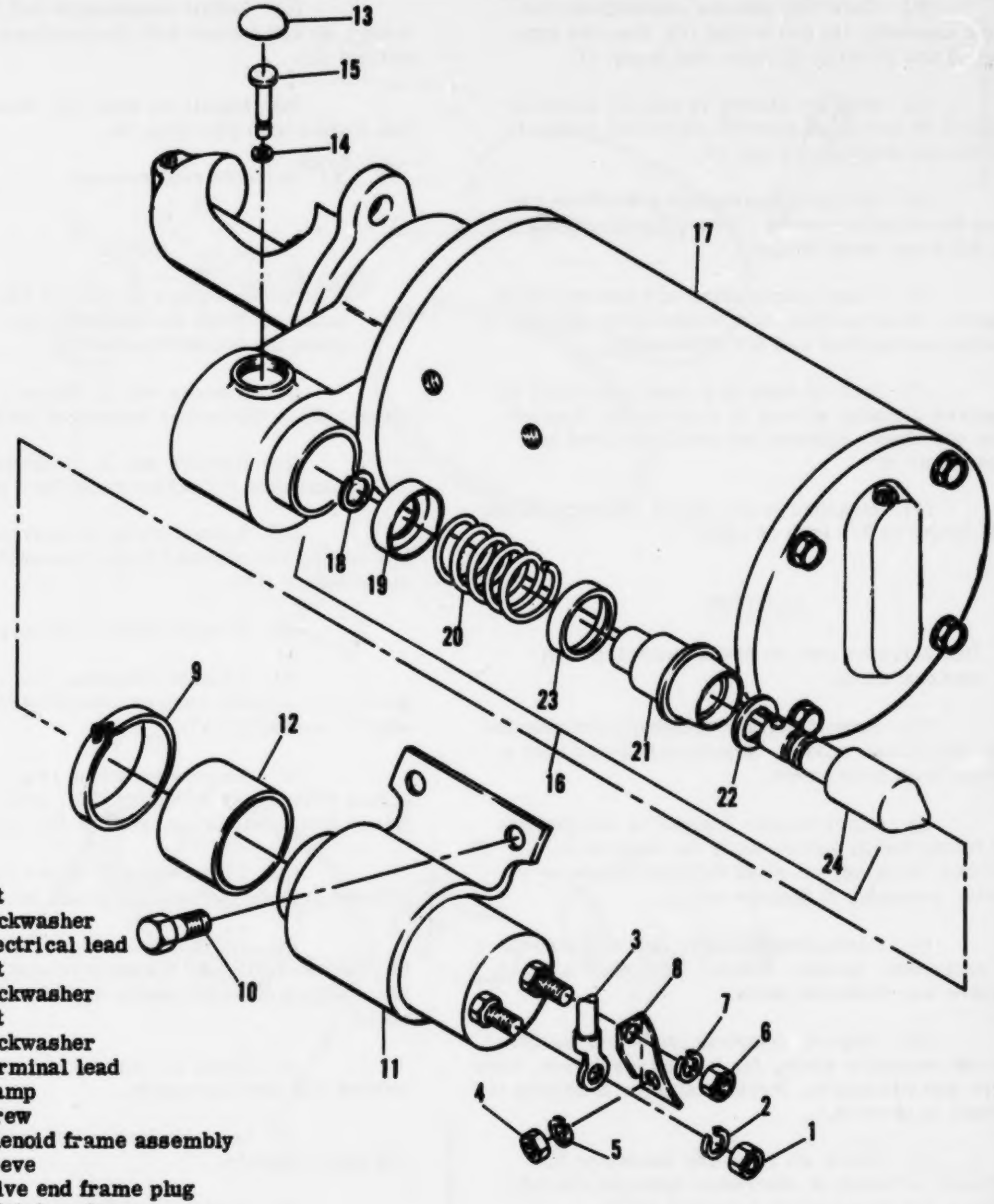
(k) Inspect seal for damage and deterioration.

(l) Inspect spring for cracks, breaks, and distortion.

(m) Replace any defective parts.

(n) Install spring retainer (23), seal retainer (22), seal (21), spring (20), and spring retainer (19) onto plunger (24) and secure with retaining ring (18).

(o) Install plunger assembly (16) into drive end housing.



1. Nut
2. Lockwasher
3. Electrical lead
4. Nut
5. Lockwasher
6. Nut
7. Lockwasher
8. Terminal lead
9. Clamp
10. Screw
11. Solenoid frame assembly
12. Sleeve
13. Drive end frame plug
14. Retaining ring
15. Lever pin
16. Plunger assembly
17. Starter assembly
18. Retaining ring
19. Spring retainer
20. Spring
21. Seal
22. Seal retainer
23. Spring retainer
24. Plunger

ME 5-6115-465-12/3-12

Figure 3-12. Starter Solenoid Replacement

(p) Install lever pin (15) and secure with retaining ring (14).

(q) Install plug (13).

(r) Install sleeve (12) and clamp (9) onto drive end housing.

(s) Install solenoid frame assembly (11) and screws (10). Tighten clamp (9).

(t) Install terminal lead (8) and secure with lockwasher (7), nut (6), lockwasher (5) and nut (4).

(u) Install electrical lead (3) and secure with lockwasher (2) and nut (1).

d. Testing.

(1) Check specific gravity of batteries to determine state of charge (paragraph 3-65). Charge or repalce batteries if necessary.

(2) Open the right side engine compartment access door. Listen for audible evidence of solenoid actuation while someone attempts to start the generator set (paragraph 2-10).

(3) If no sounds of solenoid actuation are heard, proceed as follows:

(a) Set selector switch of a multimeter to the 50 Vdc position.

CAUTION

Maintain proper polarity when connecting multimeter. Electrical lead (3, figure 3-12) is positive lead.

(b) Connect multimeter between positive solenoid terminal and starter ground terminal.

(c) If multimeter does not indicate approximately 24 Vdc, trouble is in wiring and not the solenoid.

CAUTION

Always disconnect negative (ground) cable first

(d) If multimeter indicates approximately 24 Vdc, disconnect leads from starter.

(e) Using multimeter as an ohmmeter, check for indication of open circuit across solenoid terminals.

(f) If multimeter indicates open circuit, replace solenoid (subparagraph c.(2) above).

(g) If multimeter indicates continuity, reconnect electrical leads.

(4) If solenoid actuates, but starter will not rotate engine, proceed as follows:

(a) Set selector switch of multimeter to the 50 Vdc position.

CAUTION

Maintain proper polarity when connecting multimeter.

(b) Connect multimeter between starter- to-solenoid terminal and ground terminal.

(c) Observe multimeter while assistant attempts to start the generator set.

(d) If multimeter does not indicate approximately 24 Vdc, replace solenoid assembly (paragraph c. (2) above).

(e) If multimeter indicates correct voltage,check brush length (paragraph b. (1) above). Replace brushes if necessary.

(5) If trouble persists, replace starter assembly.

e. Installation. Install starter assembly in reverse order of removal procedures.

3-67A. STARTER ASSEMBLY. (Effective with serial number RZ70001 and KZ00001 thru KZ02752).

a. Removal

(1) Tag and disconnect electrical leads to starter assembly (figure 3-10).

(2) Remove three bolts and lockwashers to remove starter from bell housing.

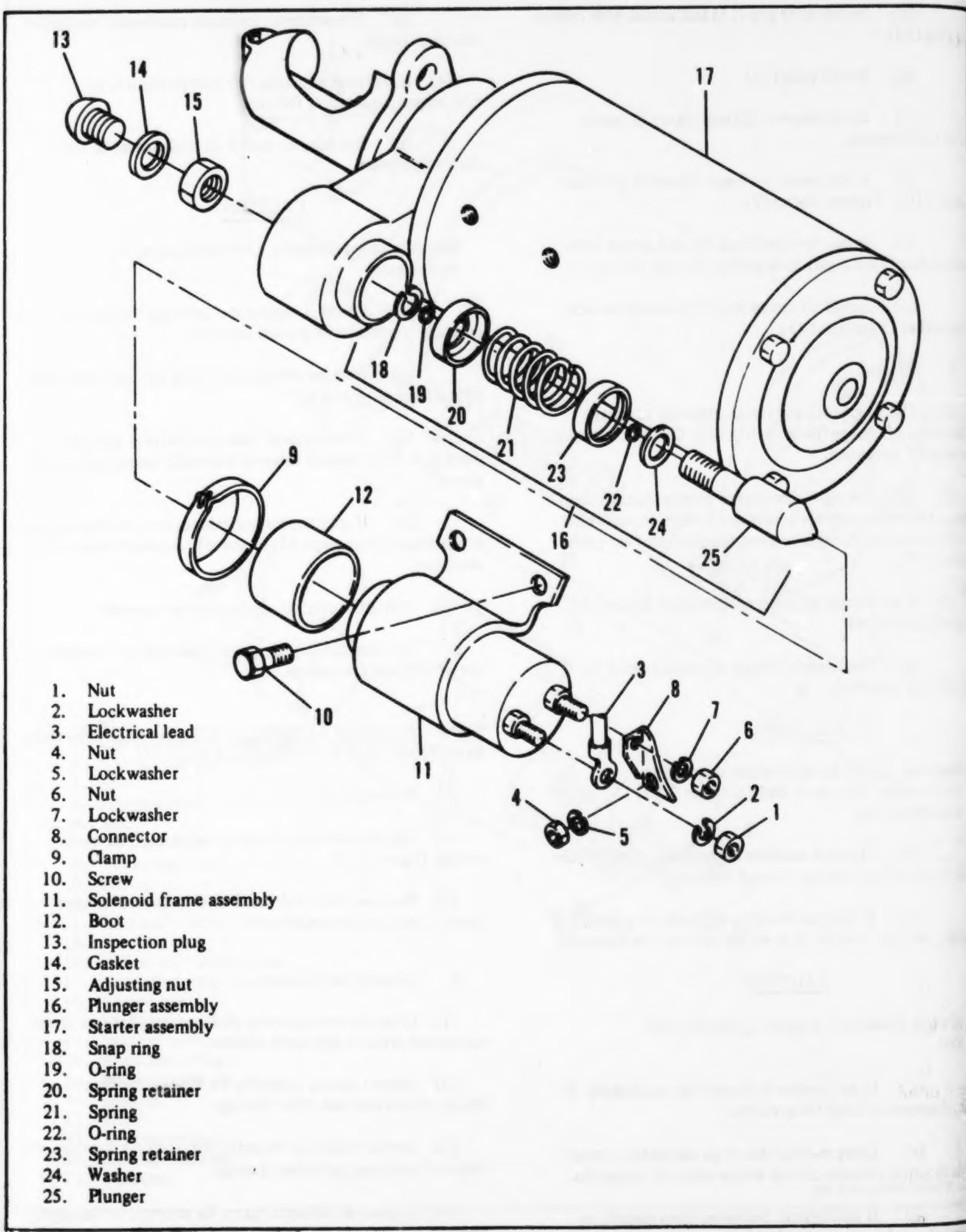
b. Cleaning and Inspection.

(1) Clean starter assembly with a clean, lint-free cloth moistened with an approved solvent.

(2) Inspect starter assembly for cracks, corrosion, evidence of shorting and other damage.

(3) Inspect solenoid assembly for cracks, corrosion, evidence of shorting and other damage.

(4) Inspect all threaded parts for stripped or damaged threads.



1. Nut
2. Lockwasher
3. Electrical lead
4. Nut
5. Lockwasher
6. Nut
7. Lockwasher
8. Connector
9. Clamp
10. Screw
11. Solenoid frame assembly
12. Boot
13. Inspection plug
14. Gasket
15. Adjusting nut
16. Plunger assembly
17. Starter assembly
18. Snap ring
19. O-ring
20. Spring retainer
21. Spring
22. O-ring
23. Spring retainer
24. Washer
25. Plunger

Figure 3-12A. Starter Solenoid Replacement (Effective with serial no. RZ70001)

c. Repair

(1) Brush replacement.

NOTE

It is not necessary to remove the starter assembly from the engine to replace the brushes.

(a) Remove screws (1, figure 3-12B) and lockwashers (2).

(b) Carefully remove commutator end frame (3) and o-ring (4).

(c) Remove screws (5 and 8) to remove electrical leads (6 and 9) and brushes (7 and 10).

(d) Remove brushholder pin (12) to remove brushholder spring (13) and brushholders (14 and 15) from brush support.

(e) Clean commutator end frame, brush support, brushholders, and brushholder springs in an approved solvent and dry thoroughly.

(f) Measure brush length. Replace brushes if length is 3/8 inch or less.

CAUTION

Use extreme care to avoid enlarging commutator slots.

(g) Inspect starter armature commutator slots for thrown solder. Remove any found with a narrow blunt instrument.

(h) Check bronze bushing in commutator end frame and armature shaft for deep wear patterns, scoring, or other damage. Replace starter assembly if damage exists.

(i) Check brushholders and brush support for corrosion, cracks, breaks, and other damage. Replace any defective parts.

(j) Inspect electrical leads and visible starter assembly wiring for burned insulation, bare wires and rub marks. Replace starter assembly if damage is present.

(k) Check all attaching hardware for stripped, crossed or otherwise damaged threads. Replace any damaged or defective parts.

(l) Install brushholders (14 and 15) and spring (13) and secure with pin (12).

(m) Install brushes (7 and 10) and electrical leads (6 and 9) and secure with screws (5 and 8).

CAUTION

Use care when installing end frame to avoid damaging the bronze armature shaft bushing.

(n) Install commutator end frame (3) and o-ring (4) and secure with lockwashers (2) and screws (1).

(2) Solenoid replacement.

NOTE

It is not necessary to remove the starter assembly from the generator set to replace the solenoid assembly.

(a) Remove nut (1, figure 3-12A) and lockwasher (2) to disconnect electrical lead (3).

(b) Remove nut (4), lockwasher (5), nut (6), lockwasher (7) and connector (8).

(c) Loosen clamp (9) and remove screws (10) to remove solenoid assembly (11). Remove boot (12).

(d) Remove inspection plug (13) and gasket (14).

(e) Remove adjusting nut (15) and remove plunger assembly (16) from starter assembly (17).

(f) Remove snap ring (18), o-ring (19), spring retainer (20), spring (21), o-ring (22), spring retainer (23), and washer (24) from plunger (25).

(g) Clean solenoid frame assembly with filtered compressed air and a soft bristle brush.

(h) Using an ohmmeter, check for continuity between solenoid frame assembly terminals. Replace entire solenoid assembly if discontinuity is noted.

(i) Clean all other parts in an approved solvent and dry thoroughly.

(j) Inspect plunger for cracks, corrosion, and other damage.

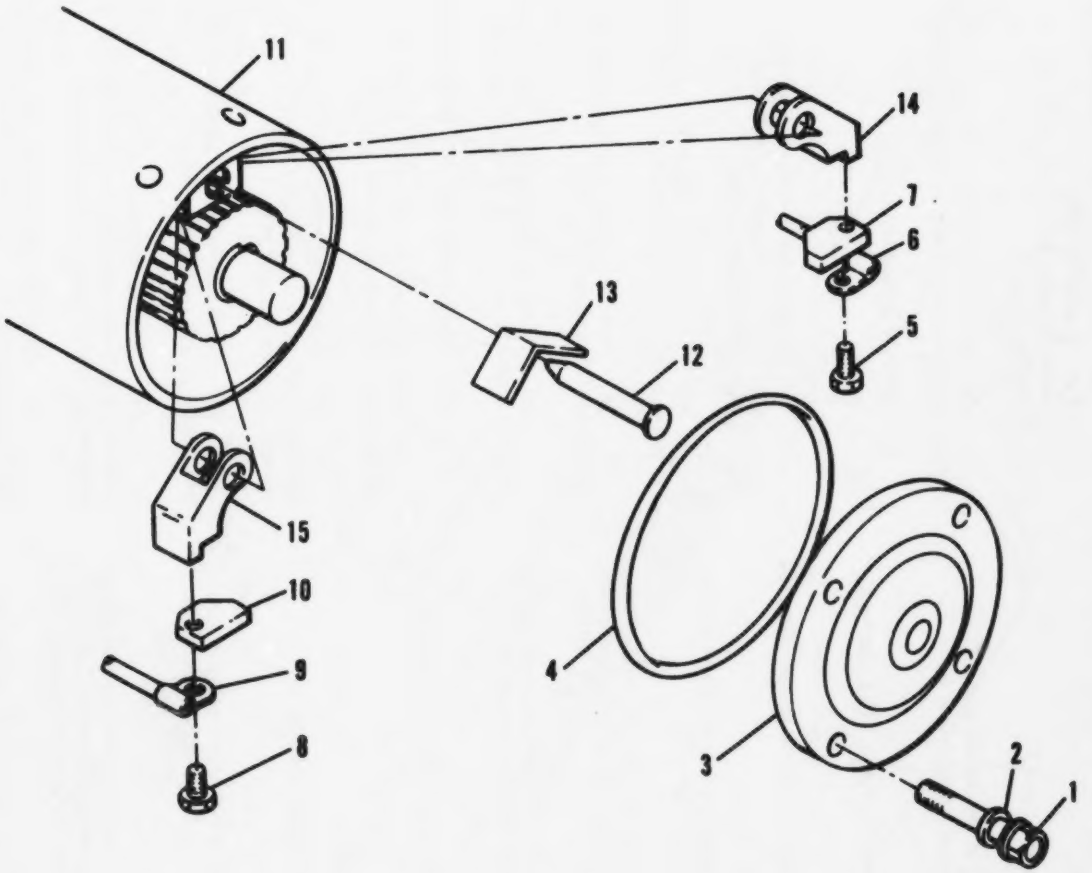
(k) Inspect seal for damage and deterioration.

(l) Inspect spring for cracks, breaks, & distortion.

(m) Replace any defective parts.

(n) Install washer (24), spring retainer (23), o-ring (22), spring (21), spring retainer (20), and o-ring (19) onto plunger (25) and secure with snap ring (18).

(o) Install plunger assembly (16) into lever housing.



1. Screw
2. Lockwasher
3. Commutator end frame
4. O-ring
5. Screw
6. Electrical lead
7. Brush
8. Screw
9. Electrical lead
10. Brush
11. Starter assy
12. Brushholder pin
13. Brushholder spring
14. Brushholder
15. Brushholder

(p) **Install adjusting nut (15) and install gasket (14) and inspection plug (13).**

(q) Install boot (12) and clamp (9) onto lever, housing.

(r) Install solenoid frame assembly (11) and screws (10). Tighten clamp (9).

(s) Install connector (8) and secure with lockwasher (5), nut (4), lockwasher (7) and nut (6).

(t) Install electrical lead (3) and secure with lockwasher (2) and nut (1).

d. Testing.

(1) Check specific gravity of batteries to determine state of charge (paragraph 3-65). Charge or replace batteries if necessary.

(2) Open the right side engine compartment access door. Listen for audible evidence of solenoid actuation while someone attempts to start the generator set (paragraph 2-10).

(3) If no sounds of solenoid actuation are heard, proceed as follows:

(a) Set selector switch of a multimeter to the 50 Vdc position.

CAUTION

Maintain proper polarity when connecting multimeter. Electrical lead (3, Figure 3-12A) is positive lead.

(b) Connect multimeter between positive solenoid terminal and starter ground terminal.

(c) If multimeter does not indicate approximately 24 Vdc, trouble is in wiring and not the solenoid.

CAUTION

Always disconnect negative (ground) cable first.

(d) If multimeter indicates approximately 24 Vdc, disconnect leads from starter.

(e) Using multimeter as an ohmmeter, check for indication of open circuit across solenoid terminals.

(f) If multimeter indicates open circuit, replace solenoid (subparagraph c.(2) above).

(g) If multimeter indicates continuity, reconnect electrical leads.

(4) If solenoid actuates, but starter will not rotate engine, proceed as follows:

(a) Set selector switch of multimeter to the 50 Vdc position.

CAUTION

Maintain proper polarity when connecting multimeter.

(b) Connect multimeter between starter-to-solenoid terminal and ground terminal.

(c) Observe multimeter while attempting to start the generator set.

(d) If multimeter does not indicate approximately 24 Vdc, replace solenoid assembly (paragraph c. (2) above)

(e) If multimeter indicates correct voltage, check brush length (paragraph b. (1) above). Replace brushes if necessary.

(5) If trouble persists, replace starter assembly.

e. Installation. Install starter assembly in reverse order of removal procedures.

3–68. BATTERY CHARGING ALTERNATOR.

a. Removal

NOTE

Test the alternator in accordance with subparagraph c. below before removal

(1) Disconnect electrical connector (1, figure 3-13).

(2) Loosen alternator mounting hardware and remove v-belt (2).

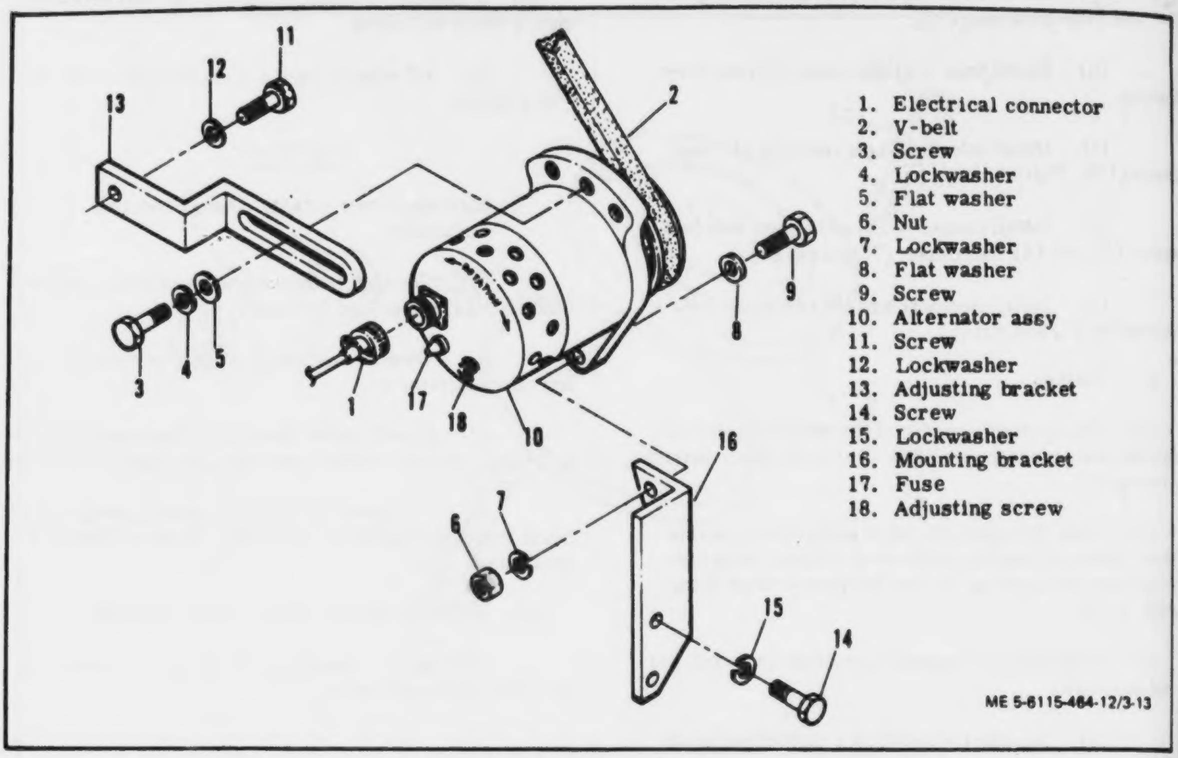
(3) Remove screw (3), lockwasher (4), and flat washer (5).

(4) Remove nut (6), lockwasher (7), flat washer (8) and screw (9) to remove alternator assembly (10).

(5) Do not remove screws (11 and 14), lockwashers (12 and 15), adjusting bracket (13) and mounting bracket (16) unless inspection reveals damage.

b. Cleaning and Inspection.

(1) Clean alternator with dry, filtered, compressed air and a soft bristle brush or wipe with a clean, lint-free cloth lightly moistened with an approved solvent.



1. Electrical connector
2. V-belt
3. Screw
4. Lockwasher
5. Flat washer
6. Nut
7. Lockwasher
8. Flat washer
9. Screw
10. Alternator assy
11. Screw
12. Lockwasher
13. Adjusting bracket
14. Screw
15. Lockwasher
16. Mounting bracket
17. Fuse
18. Adjusting screw

Figure 3-13. Battery Charging Alternator Removal and Installation

(2) Inspect alternator for cracks, corrosion, evidence of shorting and overheating, bent or broken connector pins and other damage.

(3) If the electrical connector receptacle is loose, remove end cap. Remove old rivets and refasten the receptacle with new rivets or screws and nuts.

c. Testing and Adjustment.

(1) Remove four screws attaching the rear cover plate to the alternator.

(2) Carefully pull the cover plate away from the alternator assembly.

(3) Fabricate two test leads as follows:

(a) Cut two pieces of No. 8 or No. 10 insulated wire; one 5 inches long and the other 10 inches long.

(b) Strip both ends of each wire and tin with solder (Federal Specification QQ-S-571).

(c) Attach a No. 10 ring terminal to one end of the 10 inch test lead.

(d) Attach a No. 10 ring terminal to one end of the 5 inch wire.

(4) Attach the test leads as shown in figure 3-14 and pass the free end of each lead through a hole in the ventilated shield of the alternator housing.

(5) Carefully install the rear cover plate and secure with screws.

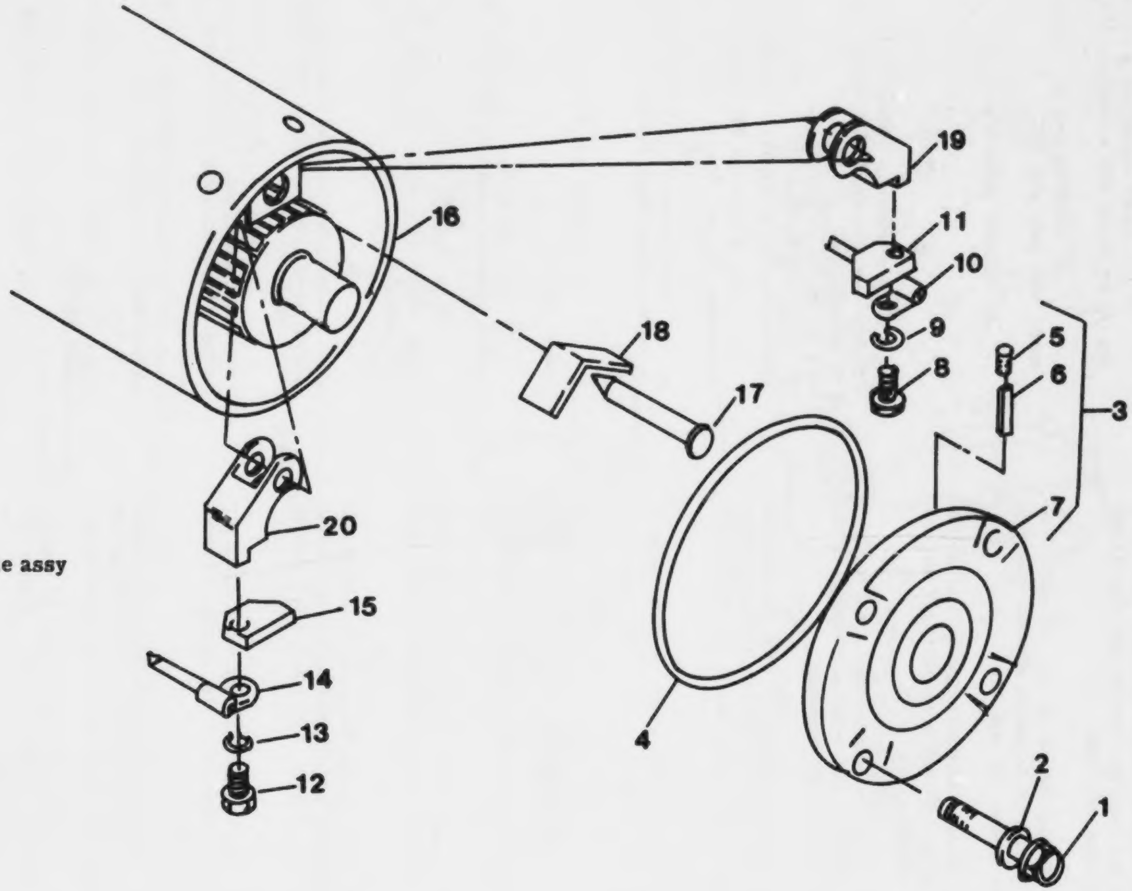
(6) If alternator is still installed in the generator set, connect wiring harness connector to the alternator.

(7) If alternator has been removed, install it in test setup as shown in figure 3-15 and provide a means of rotation at approximately 2500 rpm.

(8) Place multimeter selector in the 50 Vdc position.

(9) Operate alternator at the required rpm and note the reading on the multimeter.

(10) If multimeter reading is not in accordance with table 3-5, rotate adjusting screw to obtain proper reading.



1. Screw
2. Lockwasher
3. Commutator end frame assy
4. O-ring
5. Pipe plug
6. Oil wick
7. End frame
8. Screw
9. Lockwasher
10. Electrical lead
11. Brush
12. Screw
13. Lockwasher
14. Electrical lead
15. Brush
16. Starter assy
17. Brushholder pin
18. Brushholder spring
19. Brushholder
20. Brushholder

ME5-6115-465-12/3-11.1

Figure 3-11.1. Starter Brushes Replacement

(b) Carefully remove commutator end frame assembly (3) and o-ring (4). Remove pipe plug (5) and oil wick (6) from end frame. (7).

(c) Remove Screws (8 and 12) and lockwashers (9 and 13) to remove electrical leads (10 and 14) and brushes (11 and 15).

(d) Remove brushholder pin (17) to remove brushholder spring (18) and brushholders (19 and 20) from brush support.

(e) Clean commutator end frame, brush support, brushholders, and brushholder springs in an approved solvent and dry thoroughly.

(f) Soak oil wick in a small container of approved cleaning solvent to remove oil. Remove from container, squeeze out excess solvent and allow to air dry.

(g) Measure brush length. Replace brushes if length is ⅜ inch or less.
0

CAUTION

Use extreme care to avoid enlarging commutator slots.

(h) Inspect starter armature commutator slots for thrown solder. Remove any found with a narrow blunt instrument.

(i) Check bronze bushing in commutator end frame and armature shaft for deep wear patterns, scoring, or other damage. Replace starter assembly if damage exists.

(j) Check brushholders and brush support for corrosion, cracks, breaks, and other damage. Replace any defective parts.

(k) Inspect electrical leads and visible starter assembly wiring for burned insulation, bare wires and rub marks. Replace starter assembly if damage is present.

(l) Check all attaching hardware for stripped, crossed or otherwise damaged threads. Replace any damaged or defective parts.

(m) Install brushholders (19 and 20) and spring (18) and secure with pin (17).

(n) Install brushes (11 and 15) and electrical leads (10 and 14) and secure with lockwashers (9 and 13) and screws (8 and 12).

CAUTION

Use care when installing end frame to avoid damaging the bronze armature shaft bushing.

(o) Install commutator end frame (7) and o-ring (4) and secure with lockwashers (2) and screws (1).

(p) Install oil wick (6), saturate with oil and secure with pipe plug (5).

(2) Solenoid replacement.

NOTE

It is not necessary to remove the starter assembly form the generator set to replace the solenoid assembly.

(a) Remove nut (1, figure 3-12.1) and lockwasher (2) to disconnect electrical lead (3).

(b) Remove nut (4), lockwasher (5), nut (6), lockwasher (7) and terminal lead (8).

(c) Loosen clamp (9) and remove screws (10) to remove solenoid frame assembly (11). Remove sleeve (12).

(d) Remove drive housing plug (13) and gasket (14).

(e) Remove nut (17) and lockwasher (18) to remove plunger assembly (15) from starter assembly (16).

(f) Remove retaining ring (19) to separate spring retainer (20), spring (21), o-ring (22), seal clamp (23), seal (24) seal retainer (25) o-ring (26), from plunger (27).

(g) Clean solenoid frame assembly with filtered compressed air and a soft bristle brush.

(h) Using an ohmmeter, check for continuity between solenoid frame assembly terminals. Replace entire solenoid assembly if discontinuity is noted.

(i) Clean all other parts in an approved solvent and dry thoroughly.

(j) Inspect plunger for cracks, corrosion, and other damage.

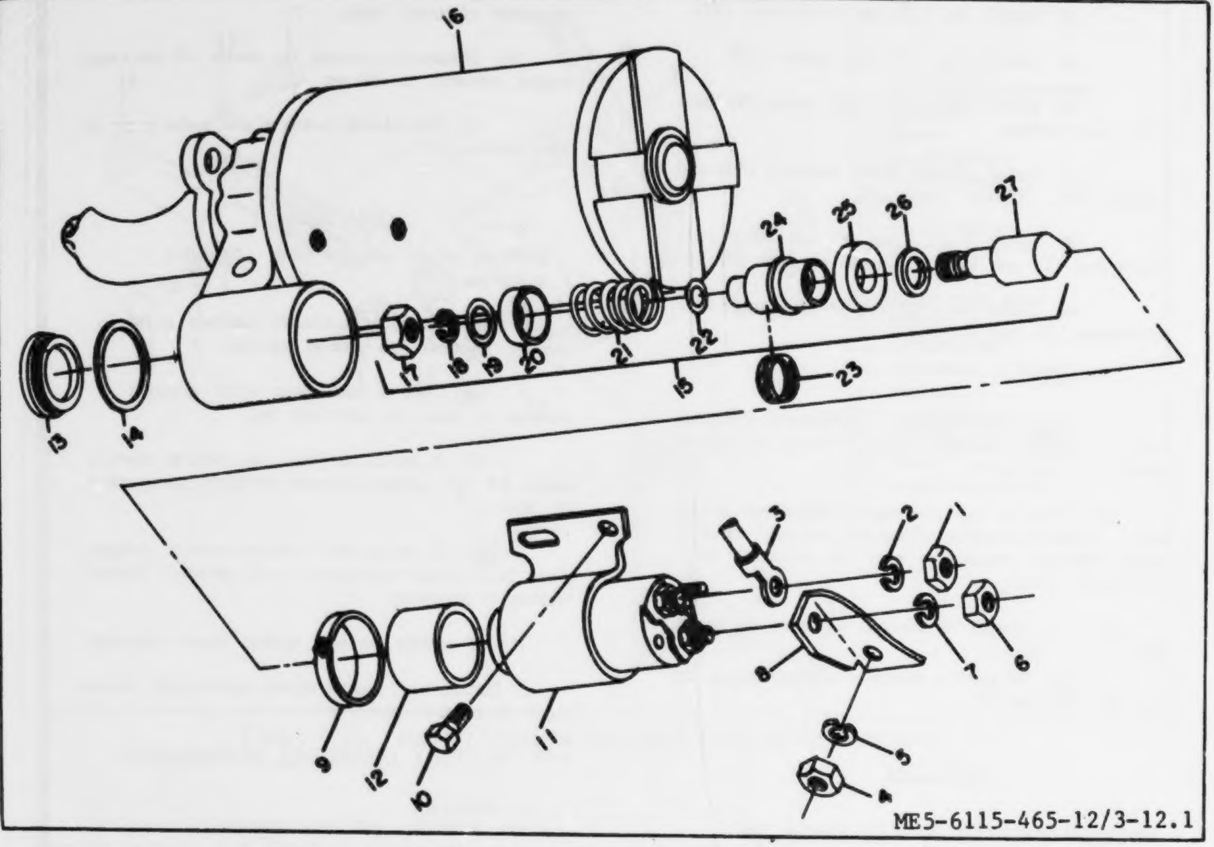
(k) Inspect seal for damage and deterioration.

(l) Inspect spring for cracks, breaks, and distortion.

(m) Replace any defective parts.

(n) Install O-ring (26) seal retainer (25), seal (24), seal clamp (23), O-ring (22), spring (21), spring retainer (20) with retaining ring (19) onto plunger (27).

(o) Install plunger assembly (15) into drive housing.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12
11
10
5
4

ME5-6115-465-12/3-12.1

Figure 3-12.1. Starter Solenoid Replacement.

1. Nut
2. Lockwasher
3. Terminal lead
4. Nut
5. Lockwasher
6. Nut
7. Lockwasher
8. Terminal lug
9. Clamp
10. Screw
11. Solenoid frame assembly
12. Sleeve
13. Plug
14. Gasket
15. Plunger assembly
16. Starter assembly
17. Nut
18. Lockwasher
19. Retaining ring
20. Spring retainer
21. Spring
22. O ring
23. Seal clamp
24. Seal
25. Seal retainer
26. O ring
27. Plunger

(p) Install nut (17) and lockwasher (18).

(q) Install plug (13) and gasket (14).

(r) Install sleeve (12) and clamp (9) onto drive end housing.

(s) Install solenoid frame assembly (11) and screws (10). Tighten clamp, (9).

(t) Install terminal lug (8) and secure with lockwasher (7), nut (6), lockwasher (5) and nut (4).

(u) Install electrical lead (3) and secure with lockwasher (2) and nut (1).

d. Testing.

(1) Check specific gravity of batteries to determine state of charge (paragraph 3-65). Charge or replace batteries if necessary.

(2) Open the right side engine compartment access door. Listen for audible evidence of solenoid actuation while someone attempts to start the generator set (paragraph 2-10).

(3) If no sounds of solenoid actuation are heard, proceed as follows:

(a) Set selector switch of a multimeter to the 50 Vdc position.

CAUTION

Maintain proper polarity when connecting multimeter. Electrical lead (3, figure 3-12.1) is positive lead.

(b) Connect multimeter between positive solenoid terminal and starter ground terminal.

(c) If multimeter does not indicate approximately 24 Vdc, trouble is in wiring and not the solenoid.

CAUTION

Always disconnect negative (ground) cable first.

(d) If multimeter indicates approximately 24 Vdc, disconnect leads from starter.

(e) Using multimeter as an ohmmeter, check for indication of open circuit across solenoid terminals.

(f) If multimeter indicates open circuit, replace solenoid (subparagraph c. (2) above).

(g) If multimeter indicates continuity, reconnect electrical leads.

(4) If solenoid actuates, but starter will not rotate engine, proceed as follows:

(a) Set selector switch of multimeter to the 50 Vdc position.

CAUTION

Maintain proper polarity when connecting multimeter.

(b) Connect multimeter between starter-to-solenoid terminal and ground terminal.

(c) Observe multimeter while assistant attempts to start the generator set.

(d) If multimeter does not indicate approximately 24 Vdc, replace solenoid assembly (paragraph c. (2) above).

(e) If multimeter indicates correct voltage, check brush length (paragraph b. (1) above). Replace brushes if necessary.

(5) If trouble persists, replace starter assembly.

e. Installation. Install starter assembly in reverse order of removal procedures.

3-68. BATTERY CHARGING ALTERNATOR.

a. Removal.

NOTE

Test the alternator in accordance with subparagraph c. below before removal.

(1) Disconnect electrical connector (1, figure 3-13.

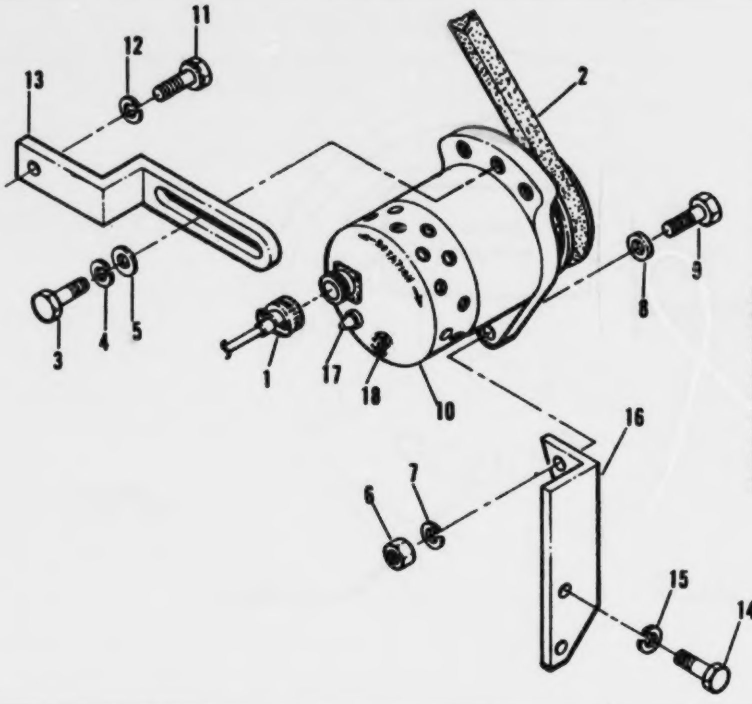
(2) Loosen alternator mounting hardware and remove v-belt (2).

(3) Remove screw (3), lockwasher (4), and flat washer (5).

(4) Remove nut (6), lockwasher (7), flat washer (8) and screw (9) to remove alternator assembly (10).

(5) Do not remove screws (11 and 14), lockwashers (12 and 15), adjusting bracket (13) and mounting bracket (16) unless inspection reveals damage.

b. Cleaning and Inspection.



1. Electrical connector
2. V-belt
3. Screw
4. Lockwasher
5. Flat washer
6. Nut
7. Lockwasher
8. Flat washer
9. Screw
10. Alternator assy
11. Screw
12. Lockwasher
13. Adjusting bracket
14. Screw
15. Lockwasher
16. Mounting bracket
17. Fuse
18. Adjusting screw

Figure 3-13. Battery Charging Alternator Removal and Installation

(1) Clean alternator with dry, filtered, compressed air and a soft bristle brush or wipe with a clean, lint-free cloth lightly moistened with an approved solvent.

(2) Inspect alternator for cracks, corrosion, evidence of shorting and overheating, bent or broken connector pins and other damage.

c. Testing and Adjustment.

(1) Remove four screws attaching the rear cover plate to the alternator.

(2) Carefully pull the cover plate away from the alternator assembly.

(3) Fabricate two test leads as follows:

(a) Cut two pieces of No. 8 or No. 10 insulated wire; one 5 inches long and the other 10 inches long.

(b) Strip both ends of each wire and tin with solder (Federal Specification QQ-S-571).

(c) Attach a No. 10 ring terminal to one end of the 10 inch test lead.

(d) Attach a No. 10 ring terminal to one end of the 5 inch wire.

(4) Attach the test leads as shown in figure 3-14 and pass the free end of each lead through a hole in the ventilated shield of the alternator housing.

(5) Carefully install the rear cover plate and secure with screws.

(6) If alternator is still installed in the generator set, connect wiring harness connector to the alternator.

(7) If alternator has been removed, install it in test setup as shown in figure 3-15 and provide a means of rotation at approximately 2500 rpm.

(8) Place multimeter selector in the 50 Vdc position.

(9) Operate alternator at the required rpm and note the reading on the multimeter.

(10) If multimeter reading is not in accordance with table 3-5, rotate adjusting screw to obtain proper reading.

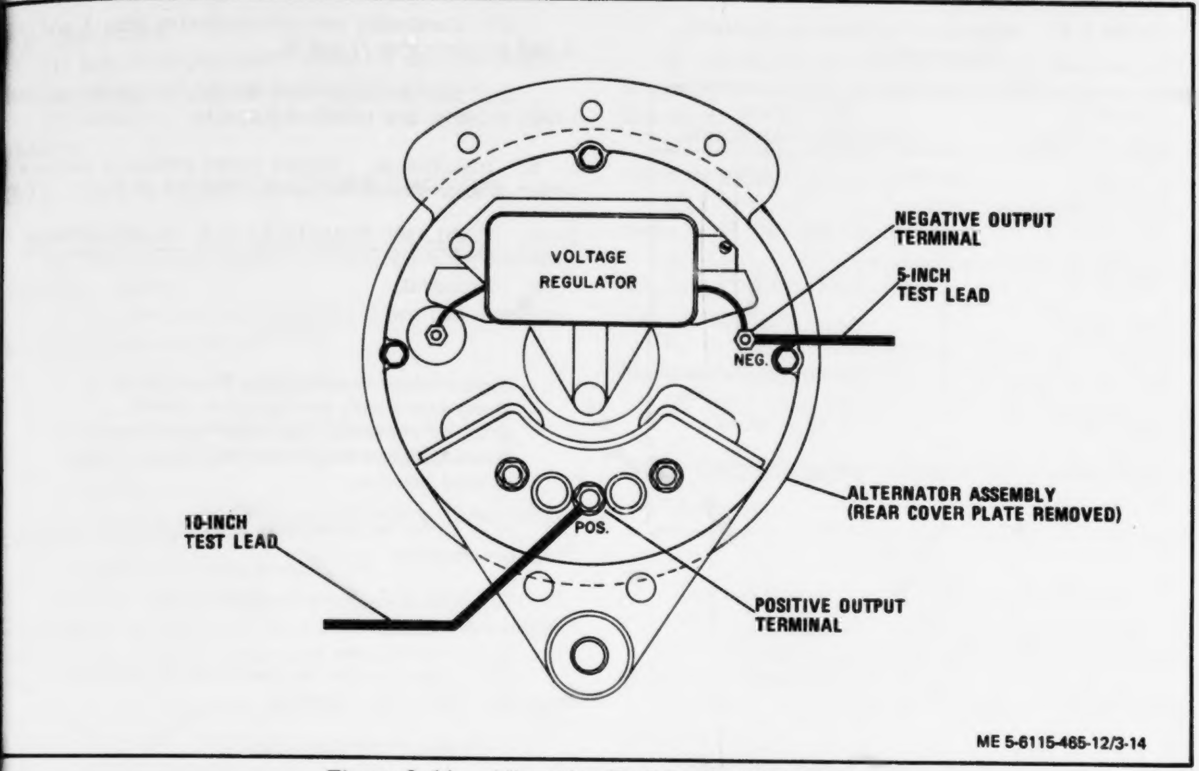

VOLTAGE REGULATOR
NEGATIVE OUTPUT TERMINAL
5-INCH TEST LEAD
NEG.
ALTERNATOR ASSEMBLY (REAR COVER PLATE REMOVED)
10-INCH TEST LEAD
POS.
POSITIVE OUTPUT TERMINAL
ME 5-6115-465-12/3-14

Figure 3-14. Alternator Test Leads Attachment

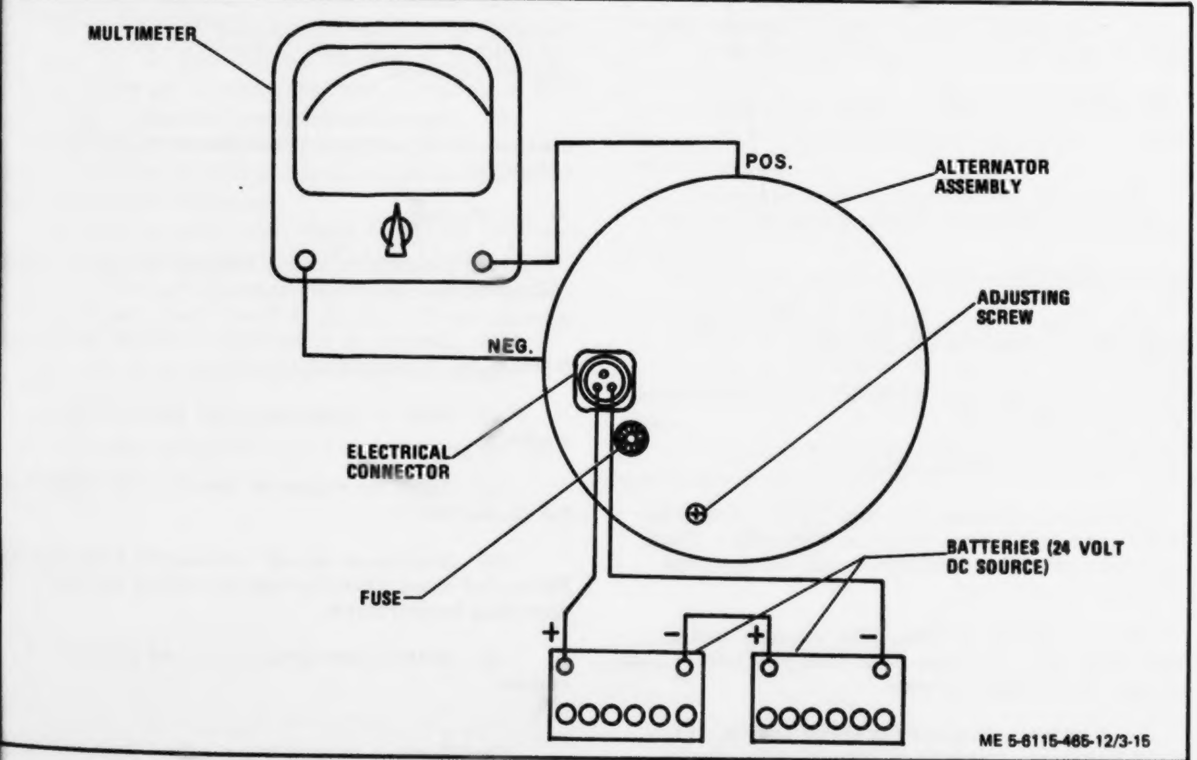

MULTIMETER
POS.
ALTERNATOR ASSEMBLY
ADJUSTING SCREW
NEG.
ELECTRICAL CONNECTOR
FUSE
BATTERIES (24 VOLT DC SOURCE)
+
−
+
−
ME 5-6115-465-12/3-15

Figure 3-15. Alternator Test Circuit

Table 3-5. Alternator Voltages at Ambient Temperature

Ambient Temperature	DC Voltage Minimum - Maximum
0° (-18°)	29.20 - 30.12
20° (-6.6°)	28.86 - 29.73
40° (4.5°)	28.64 - 29.36
60° (15.5°)	28.32 - 28.98
80° (26.6°)	28.00 - 28.60
100° (38°)	27.68 - 28.32
120° (49°)	27.32 - 28.04

NOTE

Rotating adjusting screw clockwise increases voltage output. Rotating adjusting screw counterclockwise decreases output.

(11) If proper voltage cannot be obtained with adjusting screw, replace alternator.

d. Installation. Install battery charging alternator in reverse order of removal procedures.

3-69. SPEED SWITCH.

NOTE

Test speed switch in accordance with paragraph c. below before removal.

a. Removal.

(1) Remove wiring harness connector from speed switch connector (figure 1-2).

(2) Use 1-1/8 inch wrench to loosen and remove the speed switch.

b. Cleaning and Inspection.

(1) Clean speed switch with filtered compressed air and a soft bristle brush or wipe with a clean, lint-free cloth lightly moistened with an approved solvent.

(2) Inspect speed switch for cracked casing, corrosion, bent or broken connector pins and stripped or damaged threads.

c. Testing. Replace the speed switch, if any of the following continuity or discontinuity checks are not verified.

(1) Continuity between connector pins A an B and between pins G and H.

(2) Discontinuity between pins A and C, between D and E and between F and J.

d. Installation. Install speed switch in reve order of removal procedures.

3-70. COOLANT TEMPERATURE TRANSMITTE

a. Removal.

NOTE

Test coolant temperature transmitter in accordance with paragraph c. below prior to removal. Coolant temperature transmitter is located on the engine thermostat housing.

(1) Refer to paragraph 3-31 and drain cool from the radiator.

(2) Unscrew the wiring connector from the temperature transmitter.

(3) Unscrew the temperature transmitter from the thermostat housing.

b. Cleaning and Inspection.

(1) Clean temperature transmitter with filt ed compressed air and a soft bristle brush or wit clean lint-free cloth lightly moistened with an approved solvent.

(2) Inspect temperature transmitter for cracked casing, corrosion and damaged threads a connector.

c. Testing.

(1) Disconnect wiring harness connector fr coolant temperature transmitter.

(2) Connect an ohmmeter or similar devic between the connector and casing.

(3) Refer to paragraph 2-10 and start the engine.

(4) Allow the engine to operate while obser the ohmmeter.

(5) Resistance should increase to a readin 680 to 745 ohms when the engine reaches normal operating temperature.

(6) Refer to paragraph 2-11 and stop the engine.

(7) Replace coolant temperature transmitt resistance is not within specified limits.

d. Installation.

(1) Install temperature transmitter into thermostat housing spacer and tighten to 12-15 lbs-ft torque.

(2) Refer to paragraph 3-31 and service the radiator.

3-71. OVER-TEMPERATURE SWITCH

a. Removal.

(1) Refer to paragraph 3-31 and drain the coolant from the radiator.

(2) Unscrew wiring connector from the overtemperature switch connector.

NOTE

The over-temperature switch is located on the left rear side of the engine cylinder head assembly.

(3) Unscrew over-temperature switch from cylinder head assembly.

b. Cleaning and Inspection.

(1) Clean over-temperature switch with filtered compressed air and a soft bristle brush or with a clean, lint-free cloth lightly moistened with an approved solvent.

(2) Inspect over-temperature switch for cracked casing, corrosion, stripped or damaged threads, and bent or broken connector pins.

c. Testing.

(1) Suspend over-temperature switch in a container of clean oil so that sensing element is completely immersed but not touching the sides or bottom of the container.

(2) Suspend a reliable thermometer in the container. Do not allow the end of the thermometer to rest on the bottom of the container.

(3) Using an ohmmeter, check continuity between pins A and D (figures FO-1 and FO-2) and between pins B and C of the switch connector. A and D should indicate continuity and B and C should indicate discontinuity.

(4) Attach the ohmmeter leads to pins A and D.

WARNING

Do not exceed 250°F (121.1°C) as oil may ignite.

(5) Gradually heat the oil, stirring so that heat will be evenly distributed, and observe the thermometer and ohmmeter.

(6) At 220°F ± 3°F. (104.8° + 1.5°C.) the ohmmeter should indicate discontinuity.

(7) Check continuity between pins B and C. Ohmmeter should indicate continuity.

(8) Replace the over-temperature switch if it fails to operate within the above limits.

d. Installation.

(1) Install over-temperature switch into cylinder block and tighten to 12 to 15 lbs-ft torque.

(2) Refer to paragraph 3-31 and service radiator.

3-72. Oil Pressure Transmitter (figure 1-2)

a. Removal.

NOTE

Test oil pressure transmitter in accordance with c below prior to removal.

(1) Remove nut, washer, and electrical lead from oil pressure transmitter.

(2) Unscrew oil pressure transmitter from coupling in engine block.

b. Cleaning and Inspection.

(1) Clean oil pressure transmitter with dry, filtered compressed air and a soft bristle brush or wipe with a clean, lint-free cloth lightly moistened with an approved solvent.

(2) Inspect oil pressure transmitter for cracked casing, stripped or damaged threads, corrosion, or other visible damage.

c. Testing.

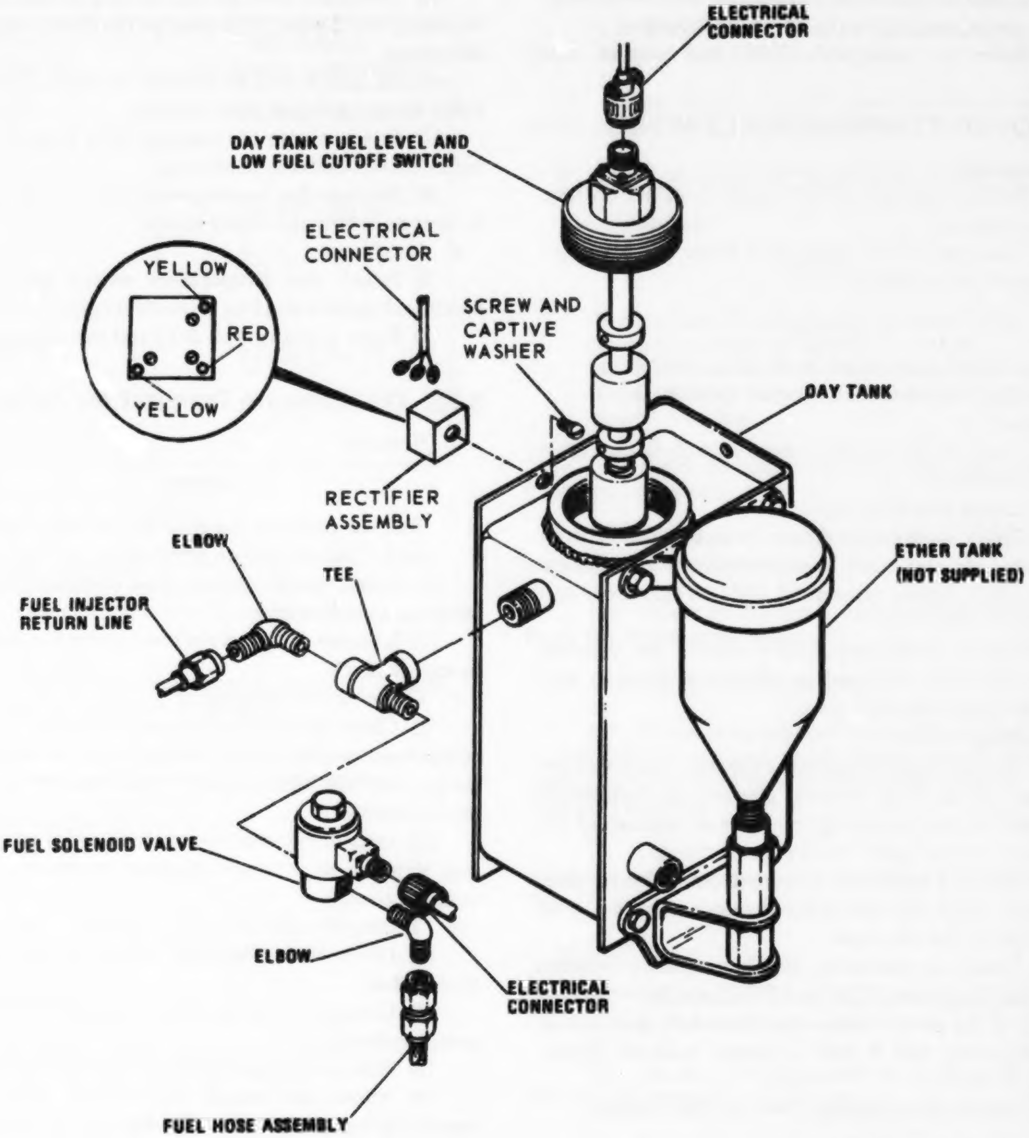
(1) Disconnect electrical lead to oil pressure transmitter.

(2) Connect an ohmmeter between transmitter terminal and casing.

(3) Refer to paragraph 2-10 and start the engine.

(4) Allow the engine to operate until normal operating temperatrue is indicated on the temperature gauge.

(5) Observe ohmmeter. Resistance shall be as specified in paragraph 1-6*b*(4).


ELECTRICAL CONNECTOR
DAY TANK FUEL LEVEL AND LOW FUEL CUTOFF SWITCH
ELECTRICAL CONNECTOR
YELLOW
RED
YELLOW
SCREW AND CAPTIVE WASHER
DAY TANK
RECTIFIER ASSEMBLY
ELBOW
TEE
FUEL INJECTOR RETURN LINE
ETHER TANK (NOT SUPPLIED)
FUEL SOLENOID VALVE
ELBOW
ELECTRICAL CONNECTOR
FUEL HOSE ASSEMBLY

ME 6115-465-12/3-16

Figure 3-16. Day tank fuel level, low fuel cutoff switch fuel solenoid valve and rectifier assembly, removal and installation.

(6) Refer to paragraph 2-11 and stop the engine.

(7) Replace oil pressure transmitter if the above resistance requirements are not met.

d. Installation.

(1) Screw oil pressure into coupling in engine block and tighten to 20 lbs-ft torque.

(2) Install electrical lead and secure with washer and nut.

3-37. Low Oil Pressure Switch

a. Removal.

NOTE

Test low oil pressure switch in accordance with subparagraph *c* below before removal.

(1) Tag and disconnect electrical connectors from low oil pressure switch (figure 1-2).

(2) Unscrew switch from block adapter.

b. Cleaning and Inspection.

(1) Clean low oil pressure switch with dry, filtered compressed air and an electrician's brush or wipe with a clean, lint-free cloth lightly moistened with an approved solvent.

(2) Inspect low oil pressure switch for cracked casing, stripped or damaged threads, corrosion, or other damage.

c. Testing.

(1) Remove wiring harness connector from low oil pressure switch.

(2) Install a jumper across wiring harness connector pins A and B (figures FO-1 and FO-2).

(3) Connect an ohmmeter across switch connector pins A and D. Ohmmeter shall indicate open circuit.

(4) Connect ohmmeter across switch connector pins B and C. Ohmmeter shall indicate continuity.

(5) Start the generator set (paragraph 2-10). Place BATTLE SHORT switch in the ON position before releasing START-RUN-STOP switch.

(6) Check that ohmmeter indicates open circuit.

(7) Connect ohmmeter across pins A and D. Ohmmeter shall indicate continuity.

(8) Stop the generator set (paragraph 2-11) and return the BATTLE SHORT switch to the OFF position.

(9) If switch meets continuity requirements, install wiring harness connector.

(10) If switch fails to meet continuity requirements, replace.

d. Installation.

(1) Install low oil pressure switch into block adapter and tighten to 20 lbs-ft torque.

(2) Install electrical connectors.

3-74. Day Tank Fuel Level and Low Fuel Cutoff Switch

NOTE

Test day tank fuel level and low fuel cutoff switch in accordance with paragraph *c* below prior to removal.

a. Removal.

(1) Disconnect electrical connector (figure 3-16).

(2) Unscrew fuel level and low fuel cutoff switch from day tank.

b. Cleaning and Inspection.

(1) Clean day tank fuel level and low fuel cutoff switch with filtered compressed air and a soft bristle brush or wipe with a clean lint- free cloth lightly moistened with an approved solvent.

(2) Inspect switch for cracked casing, corrosion, damaged floats, stripped or damaged threads and bent or broken connector pins.

c. Testing.

(1) Open the drain on the bottom of the day tank and allow the fuel to drain into a suitable container.

(2) Disconnect electrical connector from day tank fuel level and low fuel cutoff switch.

(3) Using an ohmmeter, check for continuity between swtich connector pins A and B and between pins C and D (figures FO-1 and FO-2).

(4) Conenct fuel solenoid connector and float switch connector.

(5) Place START-RUN-STOP switch (32, figure 2-7), in RUN position and BATTLE SHORT switch in ON position.

(6) When fuel transfer pumps have refilled day tank, return both switches to the original position.

(7) Disconnect fuel solenoid connector and float switch connector.

(8) Check for open circuit between pins A and B and between pins C and D.

(9) Replace switch if the above continuity requirements are not met.

d. Installation. Install day tank fuel level and low fuel cutoff switch in reverse order of removal procedures.

3-75. Fuel Solenoid Valve

a. Removal.

NOTE

Test fuel solenoid valve in accordance with paragraph *c* below before removal.

(1) Disconnect fuel supply hose, electrical connector and injector return line (figure 3-16).

(2) Unscrew tee from day tank assembly.

(3) Remove elbows and tee from fuel solenoid valve.

(4) Disconnect electrical connector from rectifier assembly.

(5) Remove screw and captive washer and remove rectifier assembly.

b. Cleaning and Inspection.

(1) Clean solenoid valve with dry, filtered compressed air and a soft bristle brush or wipe with a clean, lint-free cloth lightly moistened with an approved solvent.

(2) Inspect solenoid valve for cracks, corrosion, stripped or damaged threads, bent or broken connector pins, and evidence of shorting or other damage.

c. Testing.

(1) Open drain on bottom of day tank and allow fuel to drain into a suitable container.

(2) Place START-RUN-STOP switch in RUN position and BATTLE SHORT switch in ON position (32, figure 2-7).

(3) If day tank does not refill, check that fuel transfer pumps and day tank fuel level and low fuel cutoff switch and interconnecting wire harnesses are operational.

(4) If fuel transfer pumps and day tank fuel level and low fuel cutoff switch are operational, fuel solenoid valve is defective and must be replaced.

d. Installation. Install fuel solenoid valve in reverse order of removal procedures.

3-76. Engine Wiring Harness Assembly

a. Removal. Prior to removal, tag or otherwise identify electrical terminals, connector, and wiring and location of support clamps to facilitate installation. Remove wiring harness terminals, wires, and connectors as required for access to other components and to replace damaged parts.

b. Cleaning and Inspection.

(1) Clean engine wiring harness with filtered compressed air and a soft bristle brush or wipe with a clean, lint-free cloth moistened with an approved solvent.

(2) Visually inspect wiring harness for burned, bent, corroded or otherwise damaged connectors and terminals.

(3) Inspect insulation for burns, chafing, and deterioration.

c. Testing. Check continuity of individual wires using a multimeter or continuity light. Refer to figures FO-1 and FO-2 for wire routing.

NOTE

If more than 30 percent of the wires are damaged, or have been repaired, replace the wiring harness and forward it to higher level maintenance for rebuilding.

CAUTION

Do not use acid core solder on electrical components.

d. Repair. Replace damaged wire, terminals, and connectors by unsoldering connections, installing replacement parts and soldering connections.

e. Installation. Install wiring harness terminals, electrical leads, and connectors in reverse order of removal procedures.

Section IX. ORGANIZATIONAL MAINTENANCE OF THE ENGINE FUEL SYSTEM

3-77. GENERAL.

This section contains organizational maintenance instructions for the engine fuel system. Fuel is stored in the main fuel tank located in the generator set skid base. Two electrically driven pumps which are controlled by the day tank fuel level and low fuel cutoff switch transfer the fuel from the fuel tank to the day tank. Before entering the day tank, the fuel passes through the fuel strainer and primary fuel filter. From the day tank the fuel passes through the secondary fuel filter to the fuel injection pump. The fuel injection pump forces the fuel to the injectors in the cylinder head. Excess fuel is returned to the day tank through the fuel return line. The entire fuel system is vented through the main fuel tank filler cap.

3-78. FUEL TRANSFER PUMPS.

a. Removal.

NOTE

Test fuel transfer pumps in accordance with subparagraph d. below prior to removal.

(1) Disconnect electrical leads at pump.

(2) Disconnect fuel supply hose (1, figure 3-17) and remove elbow (2).

(3) Disconnect fuel discharge hose (3) and remove elbow (4).

(4) Remove tube assembly (5) and elbows (6 and 7).

(5) Remove nuts (8), lockwashers (9), flat washers (10) and screws (11) to remove fuel transfer pumps (12).

b. Cleaning and Inspection.

(1) Clean fuel transfer pumps with a clean, lint-free cloth moistened with an approved cloth.

(2) Inspect fuel transfer pumps for cracked casing, corrosion, stripped threads or other damage.

c. Service.

(1) Remove cover (13, figure 3-17) and gasket (14).

(2) Carefully remove filter (15) from pump body (16).

(3) Wash filter in dry cleaning solvent (Federal Specification P-D-680).

(4) Inspect filter for tears or other damage. Replace if defective.

(5) Position filter in pump body; install gasket, and secure with cover.

d. Testing.

(1) Disconnect fuel line from fuel solenoid valve (paragraph 3-75) and position to drain into a suitable graduated container.

(2) Disconnect electrical connector from day tank fuel level and low fuel cutoff switch (paragraph 3-74).

(3) Place START-RUN-STOP switch in RUN position and BATTLE SHORT switch in ON position (32, figure 2-7).

(4) Fuel transfer pump should deliver 3 gallons of fuel in 10 minutes when operating properly.

(5) Replace fuel transfer pump if it fails to operate properly.

e. Installation. Install fuel transfer pumps in reverse order of removal procedures.

3-79. FUEL STRAINER AND FILTER ASSEMBLY.

a. Removal.

(1) Refer to paragraph 3-26 and drain the fuel from the strainer and filter housings.

(2) Disconnect fuel hoses (1, figure 3-18) and remove elbows (2).

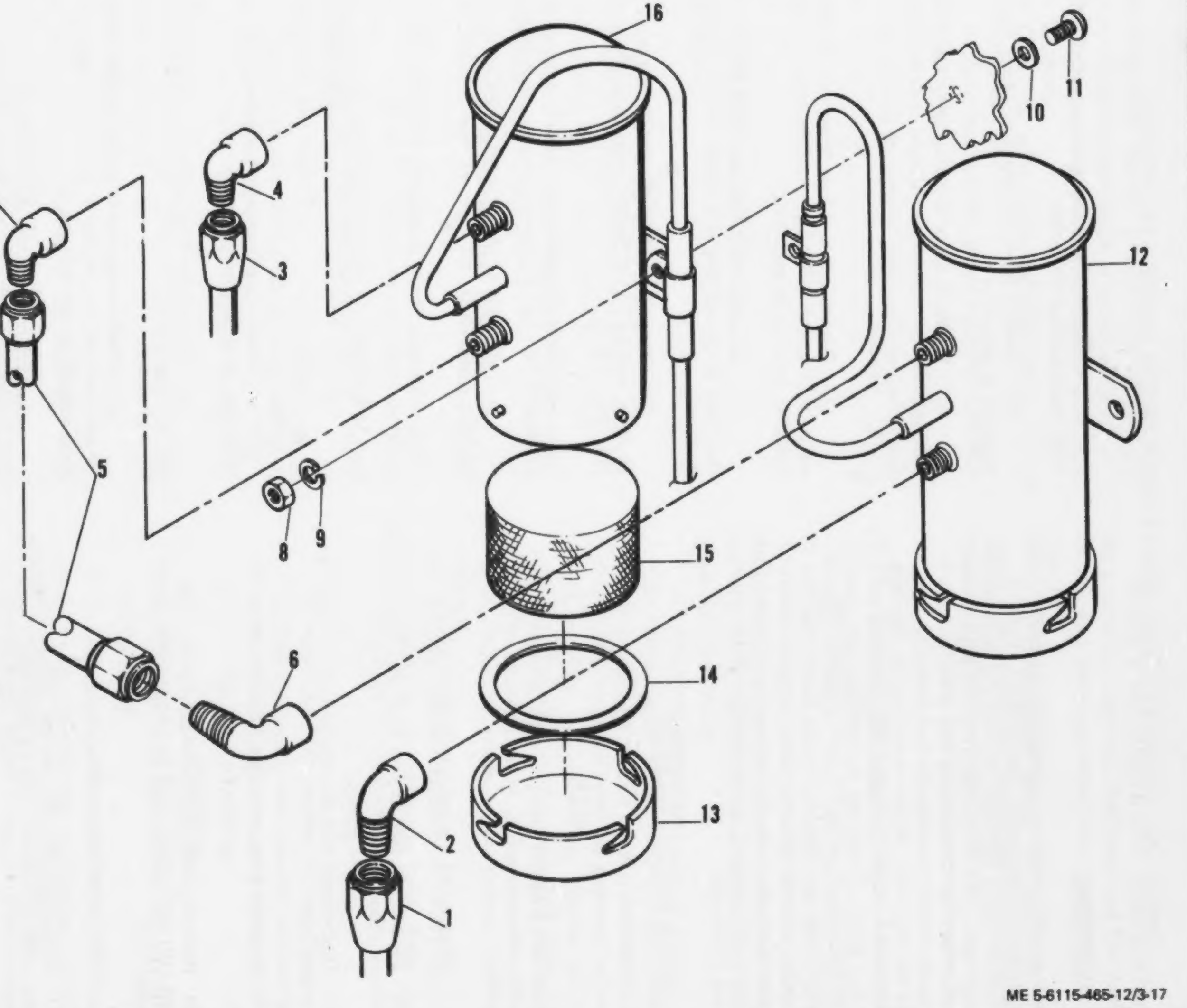
(3) Remove cap screws (3) and lockwashers (4) and remove fuel strainer and filter assembly (5) from mounting bracket (8).

(4) Do not remove capscrews (6), lockwashers (7), mounting bracket (8) or gasket (9) unless inspection reveals damage.

(5) Refer to paragraph 3-26 and disassemble fuel strainer and filter assembly.

b. Cleaning and Inspection.

(1) Clean fuel strainer and filter assembly and mounting bracket in an approved solvent and dry thoroughly.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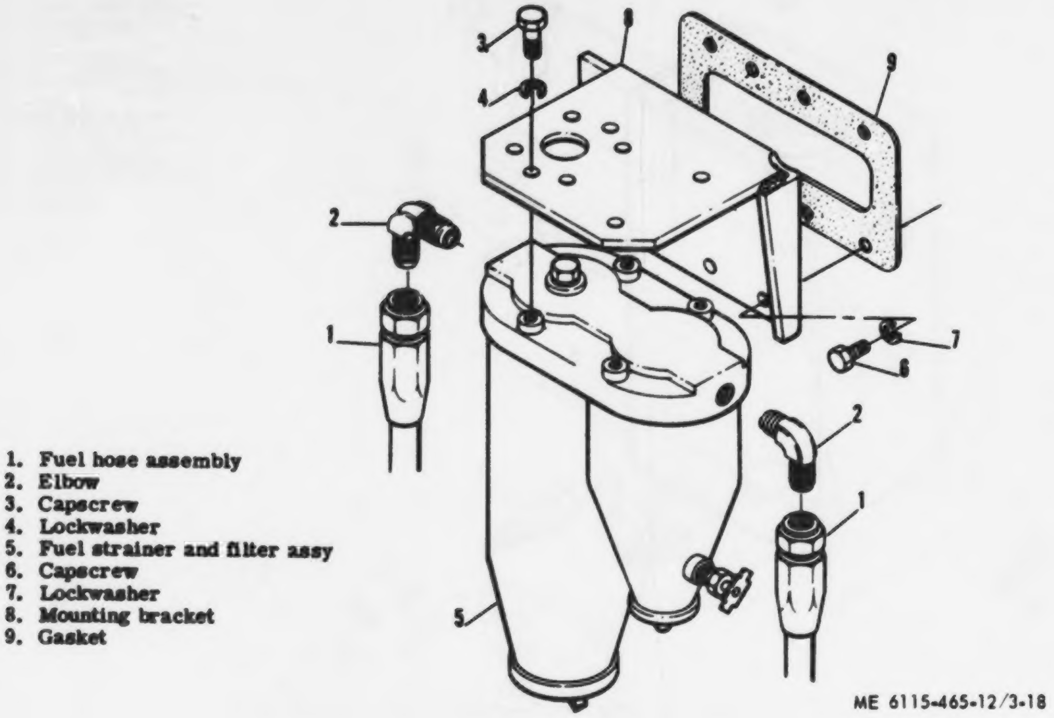
ME 5-6115-465-12/3-17

1. Fuel supply hose
2. Elbow
3. Fuel discharge hose
4. Elbow
5. Tube assembly
6. Elbow
7. Elbow
8. Nut
9. Lockwasher
10. Flat washer
11. Screw
12. Fuel transfer pump
13. Cover
14. Gasket
15. Filter
16. Pump body

Figure 3-17. Fuel Transfer Pumps, Service and Replacement



1. Fuel hose assembly
2. Elbow
3. Capscrew
4. Lockwasher
5. Fuel strainer and filter assy
6. Capscrew
7. Lockwasher
8. Mounting bracket
9. Gasket

Figure 3-18. Fuel Strainer and filter assembly, Removal and Installation.

(2) Inspect fuel strainer and filter assembly and mounting bracket for cracks, corrosion, and other damage.

(3) Inspect all threaded parts for stripped or otherwise damaged threads.

(4) Replace any damaged or defective parts.

c. *Installation.* Install fuel strainer and filter assembly in reverse order of removal procedures.

3-80. Day Tank Assembly

a. *Removal.*

(1) Refer to paragraph 3-25 and drain the day tank.

(2) Refer to paragraph 3-75 and remove fuel solenoid valve and rectifier assembly.

(3) Refer to paragraph 3-74 and remove day tank fuel level and low fuel cutoff switch.

(4) Refer to paragraph 3-84 and remove starting aid ether tank and solenoid valve.

(5) Loosen spring clamp (1, figure 3-19) and remove vent tube (2).

(6) Disconnect fuel hose assembly (3).

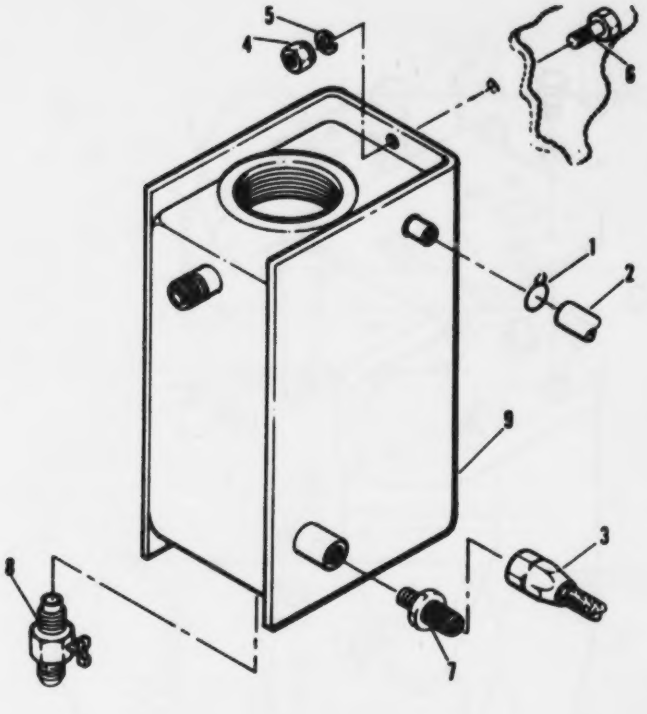
(7) Remove nuts (4), lockwashers (5) and screws (6) to remove day tank with assembled parts.

b. *Disassembly.*

(1) Remove fuel hose assembly adapter (7).

(2) Remove drain cock (8) from day tank (9).

c. *Cleaning and Inspection.*



1. Spring clamp
2. Vent tube
3. Fuel hose assy
4. Nut
5. Lockwasher
6. Screw
7. Fuel hose assy adapter
8. Drain cock
9. Day tank

Figure 3-19. Day Tank Assembly, Removal and Installation.

(1) Clean day tank with a clean, lint-free cloth moistened with an approved cleaning solvent.

(2) Inspect day tank for cracks, corrosion, stripped or damaged threads or other damage.

d. Assembly.

(1) Install drain cock (8).

(2) Install fuel hose assembly adapter (7).

e. Installation. Install day tank in reverse order of removal procedures.

3-81. Secondary Fuel Filter

a. Removal.

(1) Drain day tank assembly (paragraph 3-25).

(2) Open drain cock (1, figure 3-20) and allow fuel to drain into a suitable container.

(3) Disconnect fuel hose assemblies (2 and 3).

(4) Remove cap screws (4) and lockwashers (5) to remove secondary fuel filter (6).

(5) Remove elbows (7).

(6) Do not remove cap screws (8), lockwashers (9), mounting bracket (10) and gasket (11) unless replacement is necessary.

(7) Refer to paragraph 3-43 and disassemble fuel filter assembly.

b. Cleaning and Inspection.

(1) Clean fuel filter assembly parts and mounting bracket in an approved solvent and dry thoroughly.

(2) Inspect filter head and casing for cracks, corrosion and other damage.

(3) Inspect mounting bracket for cracks, corrosion, and cracked or broken welds.

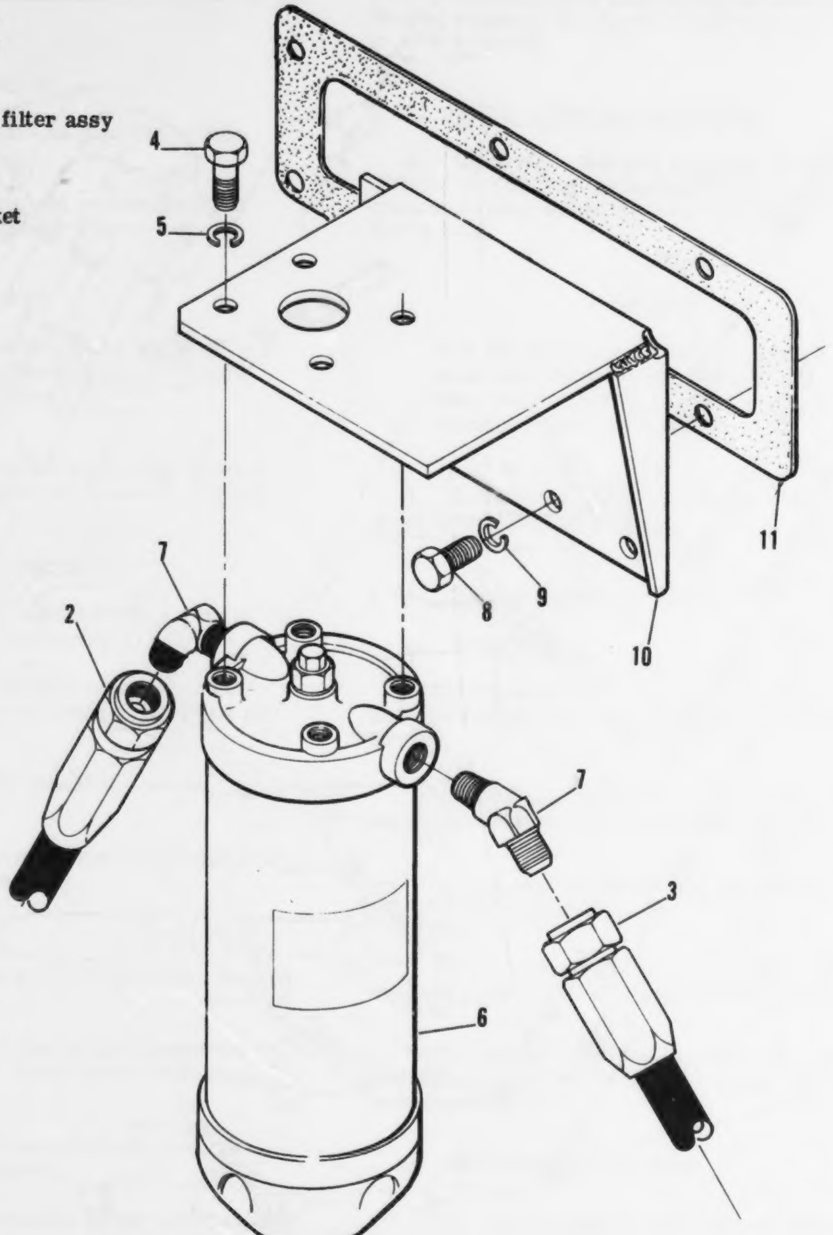
(4) Replace any defective parts.

CAUTION

Remove old filter gasket before installing new gasket; failure to do so could result in cracking the head assembly.

c. Installation. Install secondary fuel filter assembly in reverse order of removal procedures.

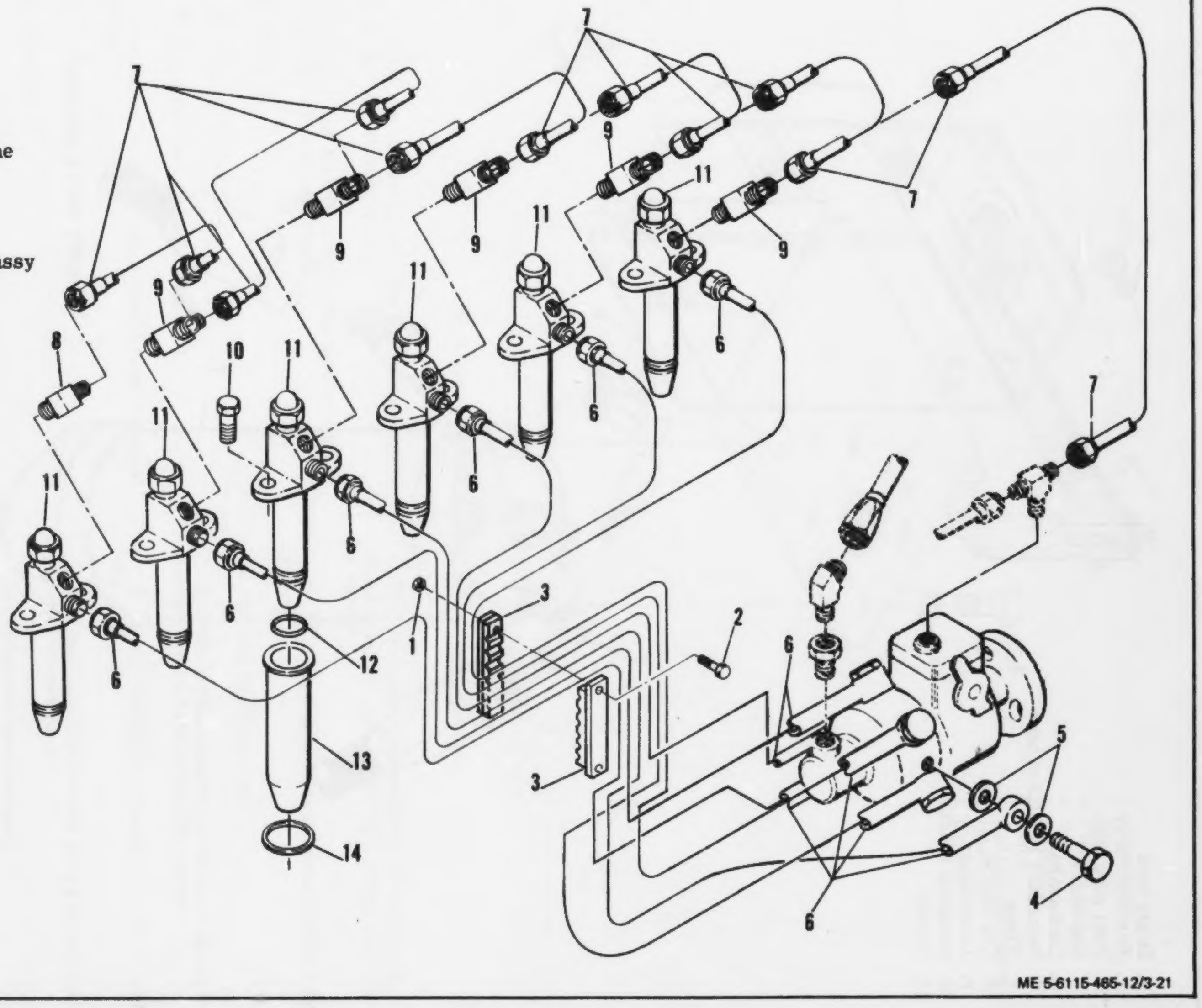
1. Drain cock
2. Fuel hose assy
3. Fuel hose assy
4. Cap screw
5. Lockwasher
6. Secondary fuel filter assy
7. Elbow
8. Cap screw
9. Lockwasher
10. Mounting bracket
11. Gasket



ME 5-6115-465-12/3-20

Figure 3-20. Secondary Fuel Filter Assembly, Removal and Installation

1. Nut
2. Screw
3. Clamp assy
4. Bolt
5. Sealing washer
6. Injector fuel line
7. Return line
8. Elbow
9. Tee
10. Screw
11. Nozzle holder assy
12. Seal
13. Sleeve
14. Seal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ME 5-6115-465-12/3-21

Figure 3-21. Fuel Injection Nozzle Holders and Lines, Exploded View

3-82. FUEL INJECTION NOZZLE HOLDERS AND LINES.

a. Removal.

NOTE

Locate faulty injectors as directed in subparagraph c. below.

(1) Remove injector and return lines and fittings (1 through 7, figure 3-21).

NOTE

Tag or otherwise identify lines and fittings and the location of support clamps to facilitate installation.

(2) Remove screws (10) to remove injector nozzle holders (11), seals (12), sleeves (13) and seals (14).

b. Cleaning and Inspection.

(1) Clean nozzle holders and lines with an approved solvent and dry thoroughly.

(2) Inspect nozzle holder assemblies for cracks, corrosion, signs of leaking, or other defects.

(3) Inspect lines for pinching, cracks, corrosion, and other damage.

(4) Check all threaded parts for stripping or otherwise damaged threads.

c. Testing.

(1) Refer to paragraph 2-10 and start the generator set.

(2) Loosen the fuel line at the injector on cylinder No. 1 until fuel flows freely from the break.

(3) If engine performance is affected, the injector is functioning properly.

(4) If engine performance is not affected, the injector is faulty and must be replaced.

(5) Tighten the injector fuel line.

(6) Repeat steps (2) through (5) for each injector.

(7) Refer to paragraph 2-11 and stop the generator set.

(8) Remove faulty injectors in accordance with subparagraph a. above.

d. Installation. Install nozzle holders and lines in reverse order of removal procedures. Sealing washers (5, figure 3-21) must be replaced at each removal.

3-83. FUEL LINES AND FITTINGS.

a. Removal. Remove damaged fuel lines and fittings by following the ascending numerical sequence of index numbers, 1 through 84, assigned to figure 3-22.

NOTE

It is not necessary to remove all fuel lines and fittings to replace a single part. Only those parts requiring replacement need be removed.

b. Installation. Install fuel lines in reverse order of removal procedure.

3-84. START AID ASSEMBLY.

a. Removal.

(1) Remove tube assembly (1, figure 3-23) and unscrew spray nozzle (2) from air cleaner housing.

(2) Remove ether tank and install protective cap (4) on solenoid valve assembly (8).

(3) Disconnect electrical connector (3) from solenoid valve assembly.

(4) Remove nuts (5), screws (6), and lockwashers (7) to remove solenoid valve assembly (8).

(5) Remove nuts (9), screws (10), and lockwashers (11) to remove clamp bracket (12) from day tank assembly (13).

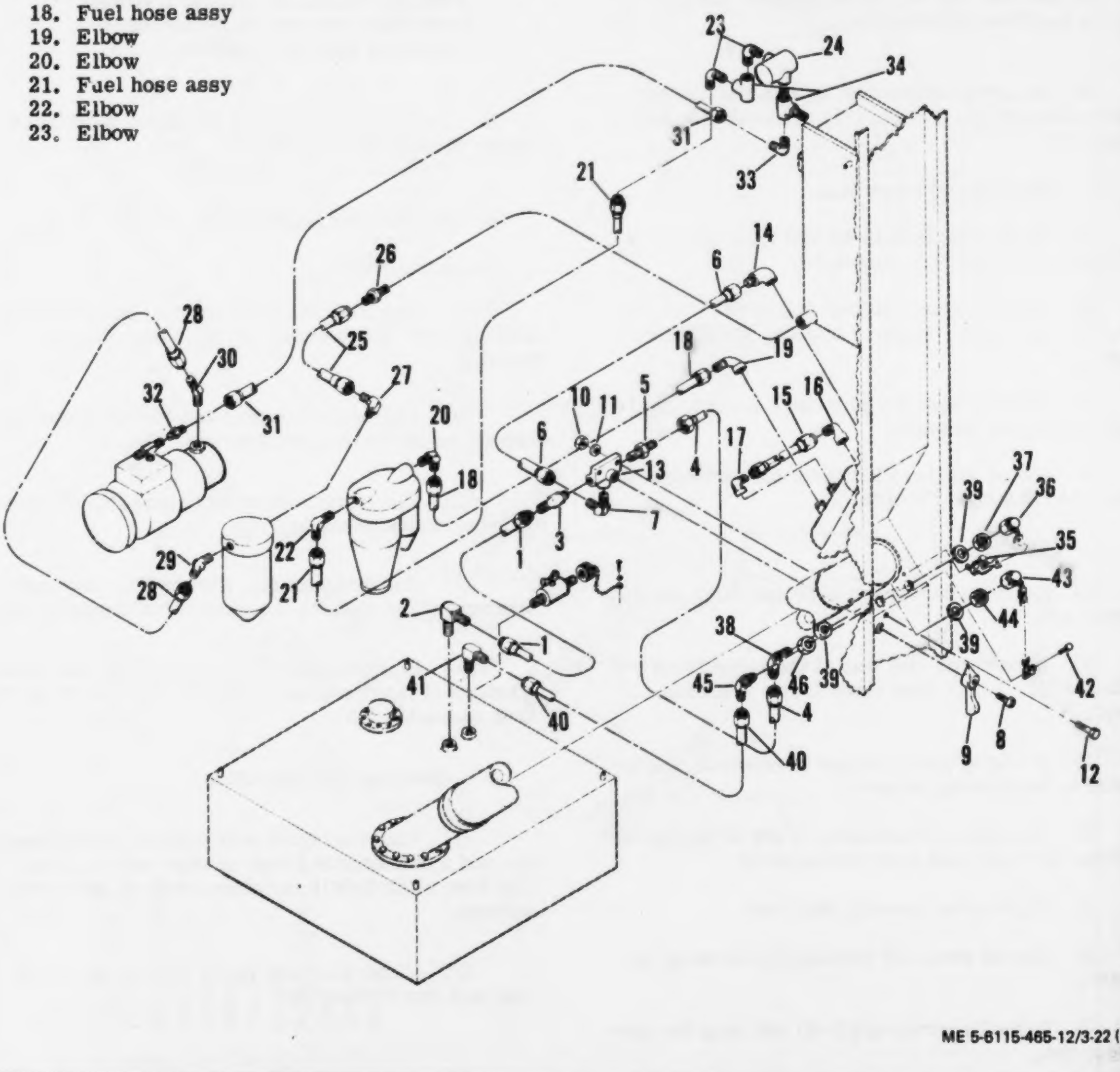
b. Cleaning and Inspection.

(1) Clean solenoid with filtered compressed air and a soft bristle brush or wipe with a clean lint-free cloth lightly moistened with an approved solvent.

(2) Clean all other parts with an approved solvent and dry thoroughly.

(3) Visually inspect start aid solenoid valve for cracks, corrosion, stripped or damaged threads and evidence of shorting or other damage.

1. Fuel supply hose assy
2. Elbow
3. Elbow
4. Auxiliary fuel hose assy
5. Adapter
6. Fuel hose assy
7. Elbow
8. Screw
9. Valve handle
10. Nut
11. Lockwasher
12. Screw
13. Three-way valve
14. Elbow
15. Tube assy
16. Elbow
17. Elbow
18. Fuel hose assy
19. Elbow
20. Elbow
21. Fuel hose assy
22. Elbow
23. Elbow
24. Fuel solenoid valve
25. Fuel hose assy
26. Connector
27. Elbow
28. Fuse hose assy
29. Elbow
30. Elbow
31. Fuel hose assy
32. Connector
33. Elbow
34. Tee
35. Screw
36. Tube cap assy
37. Nut
38. Bulkhead union
39. Washer
40. Fuel hose assy
41. Elbow
42. Screw
43. Tube cap assy
44. Nut
45. Bulkhead union
46. Nut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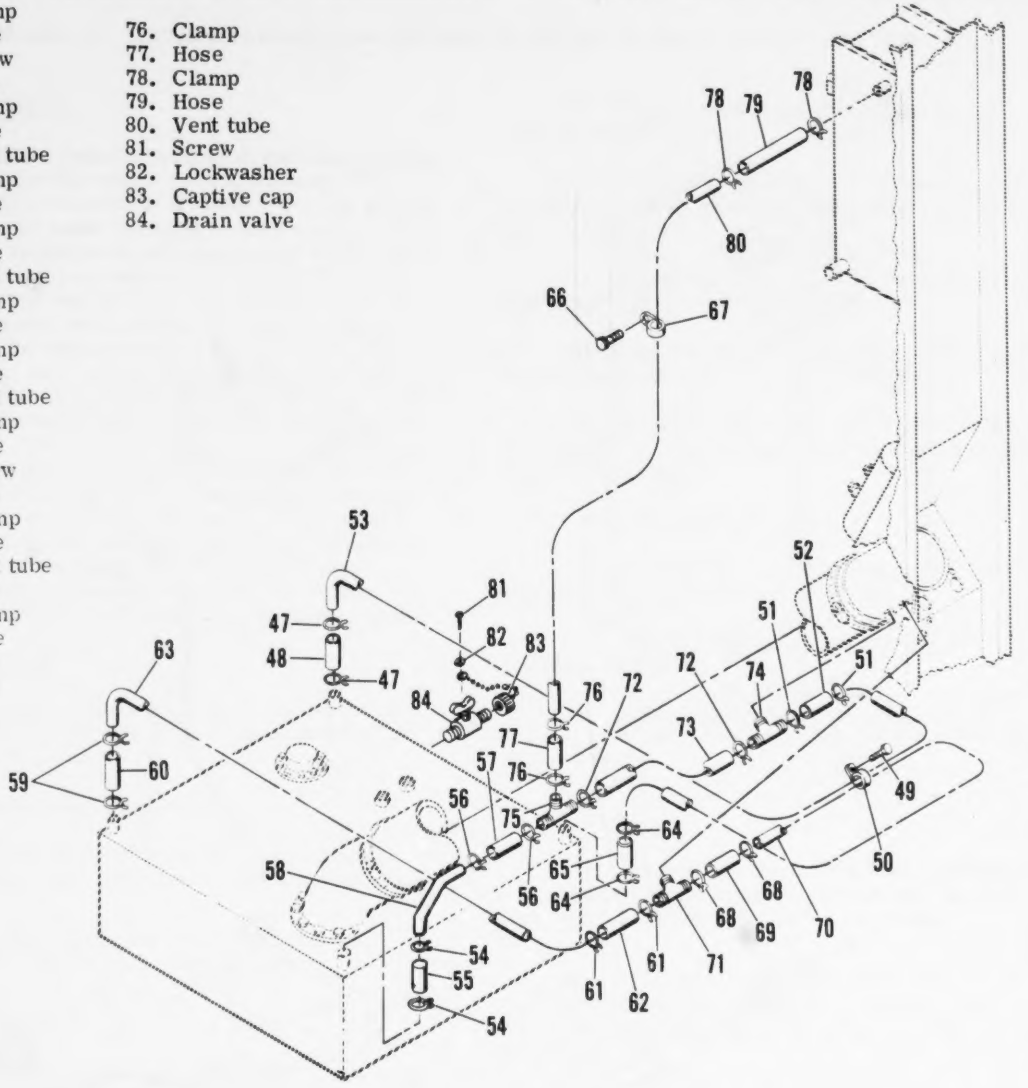
ME 5-6115-465-12/3-22 (1)

Figure 3-22. Fuel Lines and Fittings, Exploded View (Sheet 1 of 2)

47. Clamp
48. Hose
49. Screw
50. Clip
51. Clamp
52. Hose
53. Vent tube
54. Clamp
55. Hose
56. Clamp
57. Hose
58. Vent tube
59. Clamp
60. Hose
61. Clamp
62. Hose
63. Vent tube
64. Clamp
65. Hose
66. Screw
67. Clip
68. Clamp
69. Hose
70. Vent tube
71. Tee
72. Clamp
73. Hose
74. Tee
75. Tee
76. Clamp
77. Hose
78. Clamp
79. Hose
80. Vent tube
81. Screw
82. Lockwasher
83. Captive cap
84. Drain valve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ME 5-6115-465-12/3-22 (2)

Figure 3-22. Fuel Lines and Fittings, Exploded View (Sheet 2 of 2)

(4) Inspect ether tank bracket for cracks, breaks, corrosion, and other damage.

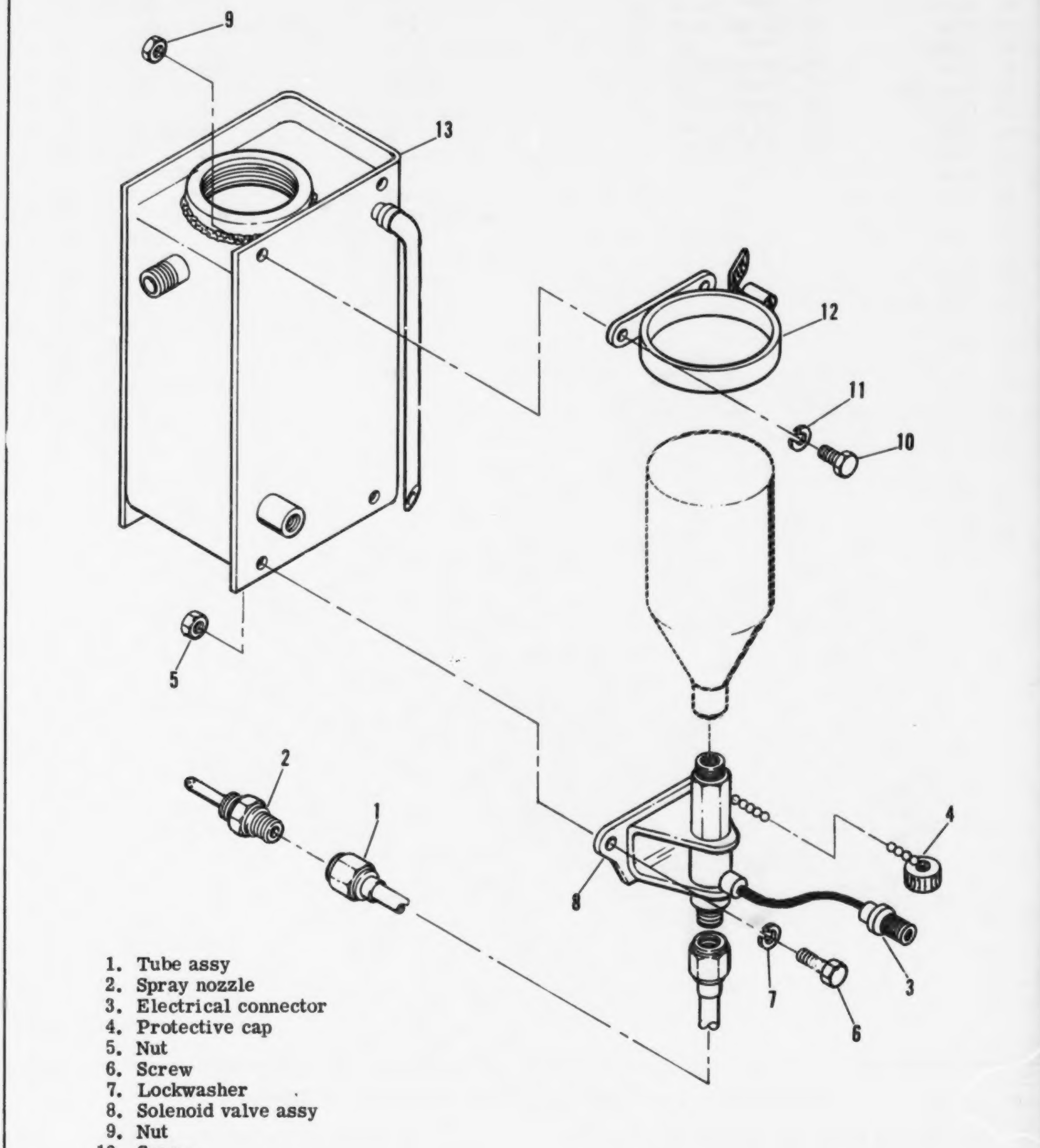
(5) Inspect tube assembly for cracks, breaks, pinching, stripped or damaged threads, and other damage.

(6) Inspect spray nozzle for cracks, corrosion, wear, clogging, or other damage.

(7) Check all threads for stripping or other damage.

(8) Replace any parts found damaged.

c. Installation. Install start aid assembly in reverse order of removal procedures.



1. Tube assy
2. Spray nozzle
3. Electrical connector
4. Protective cap
5. Nut
6. Screw
7. Lockwasher
8. Solenoid valve assy
9. Nut
10. Screw
11. Lockwasher
12. Clamp bracket
13. Day tank assy

ME 5-6115-465-12/3-23

Figure 3-23. Start Aid Assembly, Removal and Installation

Section X. ORGANIZATIONAL MAINTENANCE OF THE ENGINE COOLING SYSTEM

3-85. GENERAL.

This section contains organizational maintenance instructions for the engine cooling system. The cooling system consists of a radiator, a belt driven cooling fan and water pump, a coolant control thermotat and a thermostatically controlled shutter assembly. The water pump forces coolant through passages in the engine block and cylinder head where it absorbs heat generated by engine operation. When the engine reaches normal operating temperature, the coolant control thermostat opens and the heated coolant flows through the upper radiator hose assembly into the radiator where the heat is disipated. The cooling fan circulates air through the air passages of the radiator where it absorbs heat from the coolant tubes. The shutter assembly blocks the flow of cooling air through the radiator until the engine has reached normal operating temperature. It is equipped with a manual control which may be used in the event that the shutter control thermostat or linkage fails to function properly.

3-86. GRILLE.

a. Removal. Remove nuts (1, figure 3-24), lockwashers (2), screws (3) and flatwashers (4) to remove grille (5).

b. Cleaning and Inspection.

(1) Clean grille with a mild soap and water solution, rinse with clean water and dry thoroughly.

(2) Inspect grille for cracks, corrosion, broken welds, dents, and other damage.

c. Repair.

(1) Repair grille by straightening cross members and removing minor dents.

(2) Replace grille if damaged beyond simple repair.

d. Installation. Install grille in reverse order of removal procedures.

3-87. SHUTTER CONTROL THERMOSTAT.

a. Removal.

(1) Drain radiator and disconnect radiator hoses (paragraph 3-31).

(2) Loosen clamp (6, figure 3-24) and remove drain tube (7).

(3) Remove cotter pin (8) to disconnect shutter control linkage.

(4) Remove screws (9) and lockwashers (10) to remove control assembly and gasket (11). Discard gasket.

(5) Remove screws (12) to separate thermostat housing (13) from linkage (14).

(6) Remove gasket (15) and thermostat (16). Discard gasket.

(7) Do not remove drain cock (17) and adapter bushing (18) unless damage is present and replacement is necessary.

b. Cleaning and Inspection.

(1) Clean shutter control thermostat with an approved solvent and dry thoroughly.

(2) Inspect thermostat for cracks, corrosion, and other damage.

(3) Inspect shutter control assembly for cracks, corrosion, bent manual control lever and other damage.

c. Testing.

(1) Suspend the thermostat in a container of water so that it is completely immersed but does not touch the bottom or sides of the container.

(2) Suspend a reliable thermometer in the container so that the temperature sensing end is in the water but not touching the sides or bottom of the container.

CAUTION

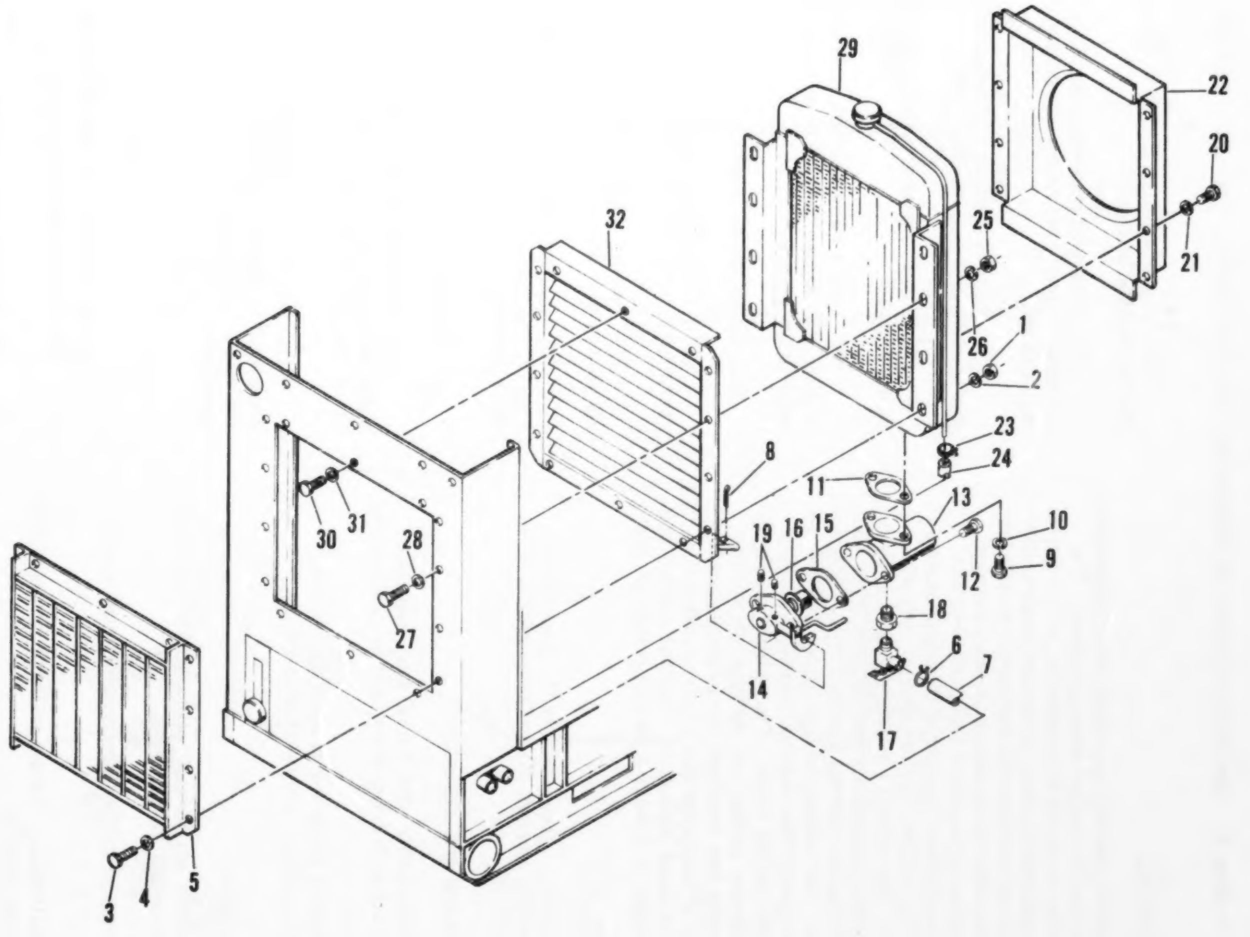
Do not overheat as damage to the thermostat may result.

(3) Gradually heat the water while stirring to distribute the heat evenly.

(4) Observe both the thermometer and the thermostat. If the thermostat is operating properly, it should begin opening when the water temperature reaches 162°F (72.2°C) and be fully open when the water temperature reaches 178°F (81.1°C).

(5) Replace the thermostat if it fails to operate properly.

1. Nut
2. Lockwasher
3. Screw
4. Flat washer
5. Grille
6. Clamp
7. Drain tube
8. Cotter pin
9. Screw
10. Lockwasher
11. Gasket
12. Screw
13. Thermostat housing
14. Linkage
15. Gasket
16. Thermostat
17. Drain cock
18. Adapter bushing
19. Set screw
20. Screw
21. Flat washer
22. Radiator shroud
23. Clamp
24. Overflow tube
25. Nut
26. Lockwasher
27. Screw
28. Flat washer
29. Radiator
30. Screw
31. Lockwasher
32. Shutter assy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ME 5-6115-465-12/3-24

Figure 3-24. Grille, Radiator, and Shutter Assembly, Exploded View

d. Installation.

(1) Install shutter control thermostat in reverse order of removal procedures. Install new gaskets (11 and 15).

(2) Loosen screws (20, figure 3-24). Push up on shutter control linkage manual control until shutter vanes are sealed, then tighten screws.

3-88. RADIATOR.

a. Removal.

(1) Drain coolant from radiator and disconnect radiator hoses (paragrapn 3-31).

(2) Remove front top housing panel and doors (paragraph 3-134).

(3) Remove shutter control thermostat and housing (paragraph 3-87).

(4) Remove fan guards (paragraph 3-31).

(5) Loosen clamps (23, figure 3-24) and disconnect overflow tube (24).

(6) Remove grille (paragraph 3-86).

(7) Remove nuts (25, figure 3-24), lockwashers (26), screws (27) and flat washers (28) to remove radiator (29).

b. Cleaning and Inspection.

(1) Clean radiator air passages with filtered compressed air.

(2) Clean exterior surfaces with a cloth moistened with an approved solvent.

(3) Inspect radiator for corrosion, dents, bent cooling fins.

(4) Check for accumulations of rust or scale in radiator openings.

(5) Refer to paragraph 3-31 and flush radiator if necessary.

c. Installation.

(1) Install radiator in reverse order of removal instructions.

(2) Fill radiator with coolant as specified in table 2-1.

3-89. SHUTTEL ASSEMBLY.

a. Removal.

(1) Remove grille (paragraph 3-86).

(2) Remove radiator assembly (paragraph 3-88).

(3) Remove screws (30, figure 3-24) and lockwashers (31) to remove shutter assembly (32).

b. Cleaning and Inspection.

(1) Clean shutter assembly with a mild soap and water solution, rinse with clean water and dry thoroughly.

(2) Inspect shutter assembly for cracks, corrosion, bent vanes and other damage.

(3) Inspect neoprene seal on leading edge of shutter vanes for damage or deterioration.

(4) Check vane support brackets for loose or missing rivets.

(5) Check control rod and linkage for damage or binding.

(6) Replace shutter assembly if damaged beyond simple repair.

c. Installation. Install shutter assembly in reverse order of removal procedures.

d. Adjustment. Adjust shutter control linkage as outlined in paragraph 3-87d. above.

3-90. V-BELT.

a. Removal.

(1) Remove screws (20, figure 3-24), flat washers (21), and shroud (22).

(2) Loosen battery charging alternator mounting hardware (paragraph 3-68).

(3) Rotate alternator toward cooling fan until v-belt is slack enough to slip over alternator pulley.

(4) Remove v-belt (1, figure 3-25) from fan pulley and crankshaft pulley.

(5) Slip v-belt between cooling fan and radiator.

b. Installation.

(1) Install fan belt in reverse order of removal procedures.

(2) Adjust fan belt tension as outlined in subparagraph c. below.

c. Adjustment.

(1) Loosen alternator mounting hardware.

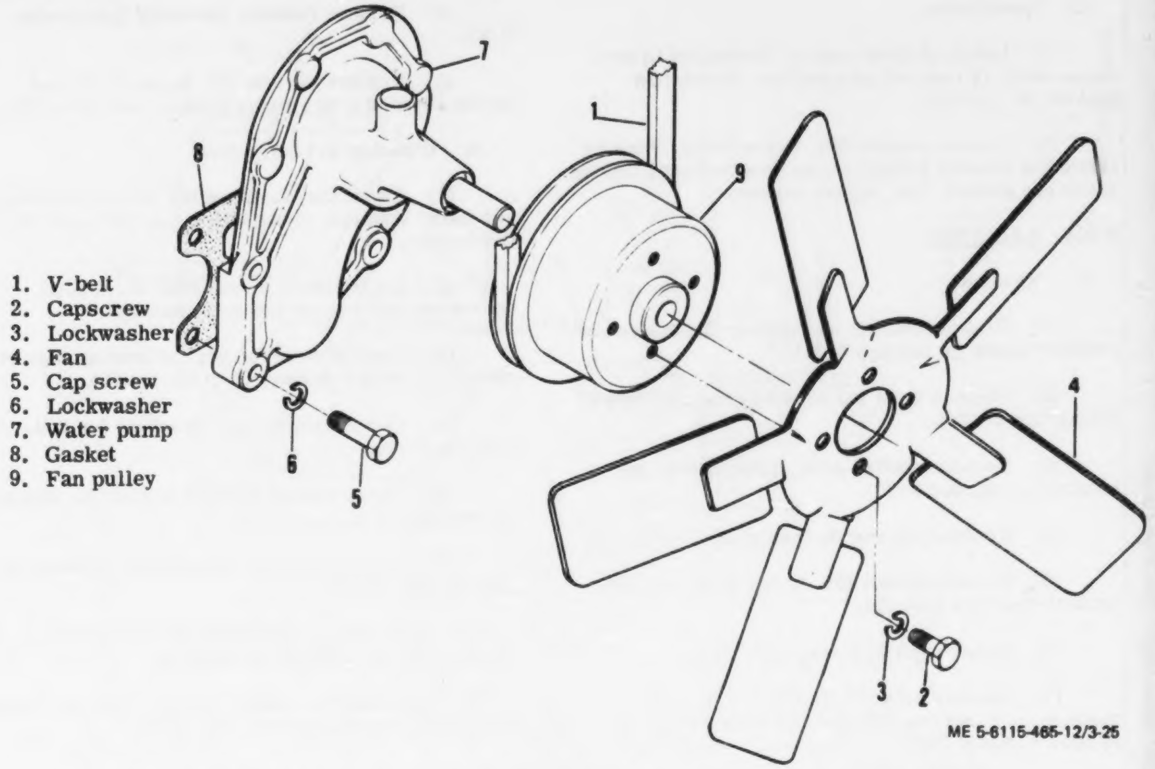


Figure 3-25. Water Pump, Cooling Fan and V-Belt, Removal and Installation

(2) Rotate alternator on pivot bolt until firm pressure on v-belt midway between alternator pulley and water pump pulley will depress it approximately 1/2 inch.

(3) Tighten alternator mounting hardware.

3-91. COOLING FAN.

a. Removal.

(1) Remove right side fan guard (paragraph 3-31b. (3).

(2) Remove v-belt as outlined in paragraph 3-90.

(3) Remove cap screws (2, figure 3-25), lockwashers (3) and fan (4).

b. Cleaning and Inspection.

(1) Clean cooling fan with a clean lint-free cloth moistened with an approved solvent.

(2) Inspect fan for bent blades, dents, cracks, corrosion and other damage.

(3) Check all threaded parts for stripped or otherwise damaged threads.

(4) Replace fan if damaged beyond simple repair.

c. Installation.

(1) Install cooling fan in reverse order of removal procedures.

(2) Install and adjust v-belt as outlined in paragraph 3-90 above.

CAUTION

When installing cooling fan, use the following procedures to insure that the fan is not installed backward.

(3) When standing in front of the engine, rotation of the fan will be clockwise. Install the fan so that the leading edges of the fan will be toward the radiator. The trailing edge (concave side) must be toward the engine.

NOTE

After installation of the fan, and prior to tightening the belt and starting the engine, rotate the fan to insure that the fan blades have sufficient clearance.

3-92. WATER PUMP.

a. Removal.

(1) Drain radiator (paragraph 3-31).

(2) Remove radiator hoses from water pump (paragraph 3-31).

(3) Remove cooling fan as described in paragraph 3-91 above.

(4) Remove cap screws (5, figure 3-25), lockwashers (6) and nut (10) to remove water pump (7) and gasket (8).

(5) Do not remove fan pulley (9) unless inspection reveals damage.

b. Cleaning and Inspection.

(1) Clean water pump with a stiff-bristle brush and an approved solvent.

(2) Inspect water pump for cracks, corrosion, evidence of leaks, and other damage.

(3) Check all threaded parts for stripped or otherwise damaged threads.

c. Installation.

(1) Install water pump in reverse order of removal procedures.

(2) Install cooling fan as outlined in paragraph 3-91 above.

3-93. COOLANT THERMOSTAT AND HOUSING.

a. Removal.

(1) Remove left side fan guard (paragraph 3-31b. (3).

(2) Refer to paragraph 3-31 and drain the radiator.

(3) Refer to paragraph 3-70 and remove the coolant temperature transmitter.

(4) Loosen clamp (1, figure 3-26) and remove radiator hose (2).

(5) Remove screws (3) and lockwashers (4) to remove thermostat housing (5), thermostat (6) gasket (7), spacer (8), and gasket (9).

c. Cleaning and Inspection.

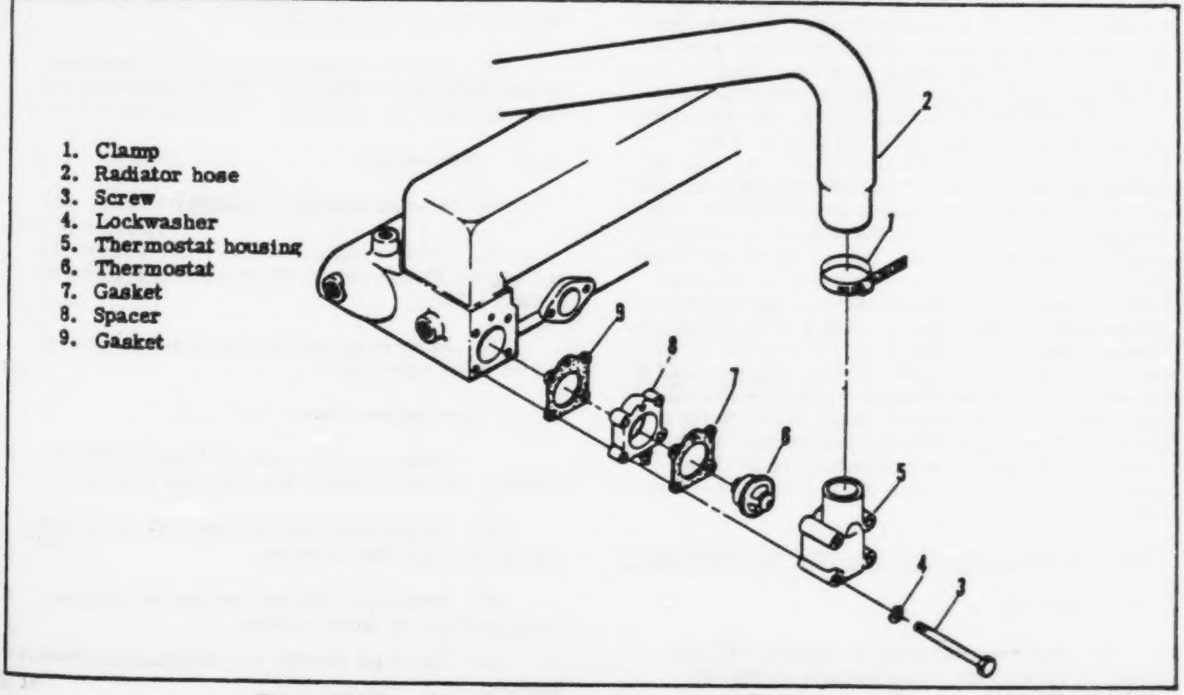


Figure 3-26. Coolant Thermostat, Removal and Installation

ME 5-6115-465-12/3-26

(1) Clean thermostat and housing with an approved solvent.

(2) Inspect thermostat for cracks, corrosion, accumulations of scale or rust, and other damage.

(3) Inspect housing for cracks, corrosion, and other damage.

c. Testing.

(1) Suspend thermostat in a container of water so that it is completely immersed but not touching the bottom or sides of the container.

(2) Suspend a reliable thermometer so that its temperature sensing end is immersed but not touching the bottom or sides of the container.

CAUTION

Do not overheat as damage to the thermostat may result.

(3) Gradually heat the water while stirring to evenly distribute the heat.

(4) Observe the thermometer and the thermostat. If the thermostat is operating properly, it should begin opening when the water temperature reaches 177° F (80.6° C) and be fully open at 205° F (96.1° C).

(5) Replace the thermostat if it fails to function properly.

d. Installation. Install thermostat in reverse order of removal procedures.

Section XI. ORGANIZATIONAL MAINTENANCE OF THE ENGINE LUBRICATION SYSTEM

3-94. GENERAL.

The oil pan serves as a cover for the bottom of the crankcase and, also, as a reservoir for engine lubricating oil. It is equipped with a bayonet type oil gauge which is used to measure the oil level in the pan. Oil is drawn into a gear type, positive displacement pump through a large screen which prevents the entry of coarse abrasives. The oil pump forces the oil through a full flow type oil filter which removes minute abrasive particles. A pressure transmitter, located between the oil pump and oil filter, measures the pump output pressure and transmits it electrically to the engine oil pressure gauge. From the oil filter, the oil enters the header, a drilled passage in the engine block. A pressure switch measures the oil pressure in the header and automatically shuts down the engine if the pressure falls to a dangerously low level. From the header, the oil is distributed to the internal moving parts of the engine. No organizational maintenance is allocated for the oil pan and oil pump. Refer to paragraph 3-72 for organizational maintenance of the oil pressure transmitter and to paragraph 3-73 for organizational maintenance of the low oil pressure switch.

3-95. LUBRICATION OF OIL FILTER ASSEMBLY.

a. Removal.

(1) Remove drain plug (1, figure 3-27) and allow the oil to drain into a suitable container.

(2) Disconnect hose assemblies (2 and 3) from the filter assembly.

(3) Remove nuts (4), lockwashers (5), flat washers (6) and screws (7).

(4) Do not remove screws (8), lockwashers (9) and mounting bracket (10) unless inspection reveals damage.

b. Disassembly.

(1) Remove elbows (11 and 12).

(2) Remove square nut (13), flat washer (14) and screw (15) to remove clamp (16) from filter assembly (17).

(3) Refer to paragraph 3-4 and disassemble the oil filter assembly.

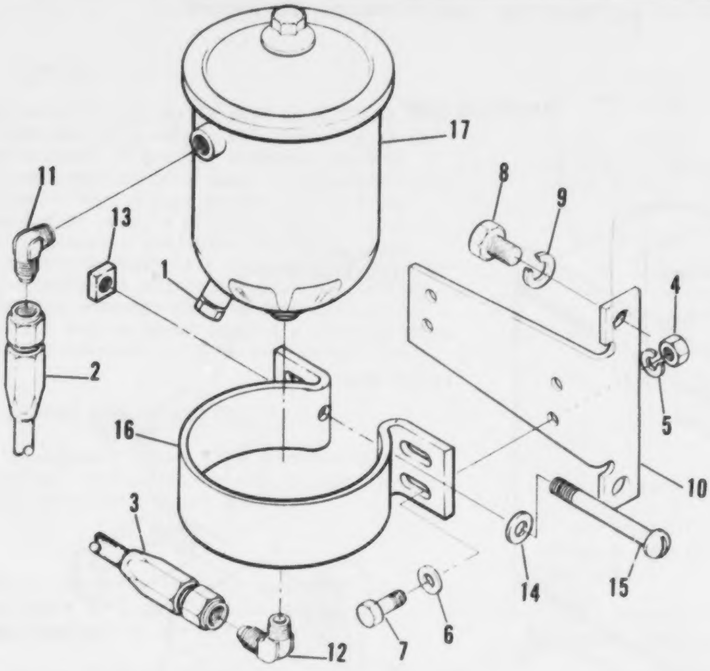
c. Cleaning and Inspection.

(1) Clean oil filter assembly parts with dry cleaning solvent (Federal Specification P-D-680).

(2) Inspect mounting bracket (10) for cracks, corrosion, and other damage.

(3) Inspect oil line assemblies for clogging, deterioration, or other damage.

(4) Check all threads for stripping or other damage.



1. Drain plug
2. Hose assy
3. Hose assy
4. Nut
5. Lockwasher
6. Flat washer
7. Screw
8. Screw
9. Lockwasher
10. Mounting bracket
11. Elbow
12. Elbow
13. Square nut
14. Flat washer
15. Screw
16. Clamp
17. Oil filter assy

ME 5-6115-465-12/3-27

Figure 3-27. Lubrication Oil Filter Assembly, Removal and Installation

d. **Repair.** Repair of oil filter assembly is limited to replacement of defective parts.

e. Assembly.

(1) Refer to paragraph 3-4 and assemble oil filter assembly.

(2) Install elbows (11 and 12) into filter assembly (17).

(3) Insert oil filter assembly (17) into clamp (16).

(4) Install screw (15), flat washer (14) and square nut (13). Tighten screw securely.

(5) Install drain plug (1) into oil filter assembly (17).

f. Installation. Install oil filter assembly in reverse order of removal instructions. Refer to figure 2-8 and run engine while checking oil level. Check for leaks.

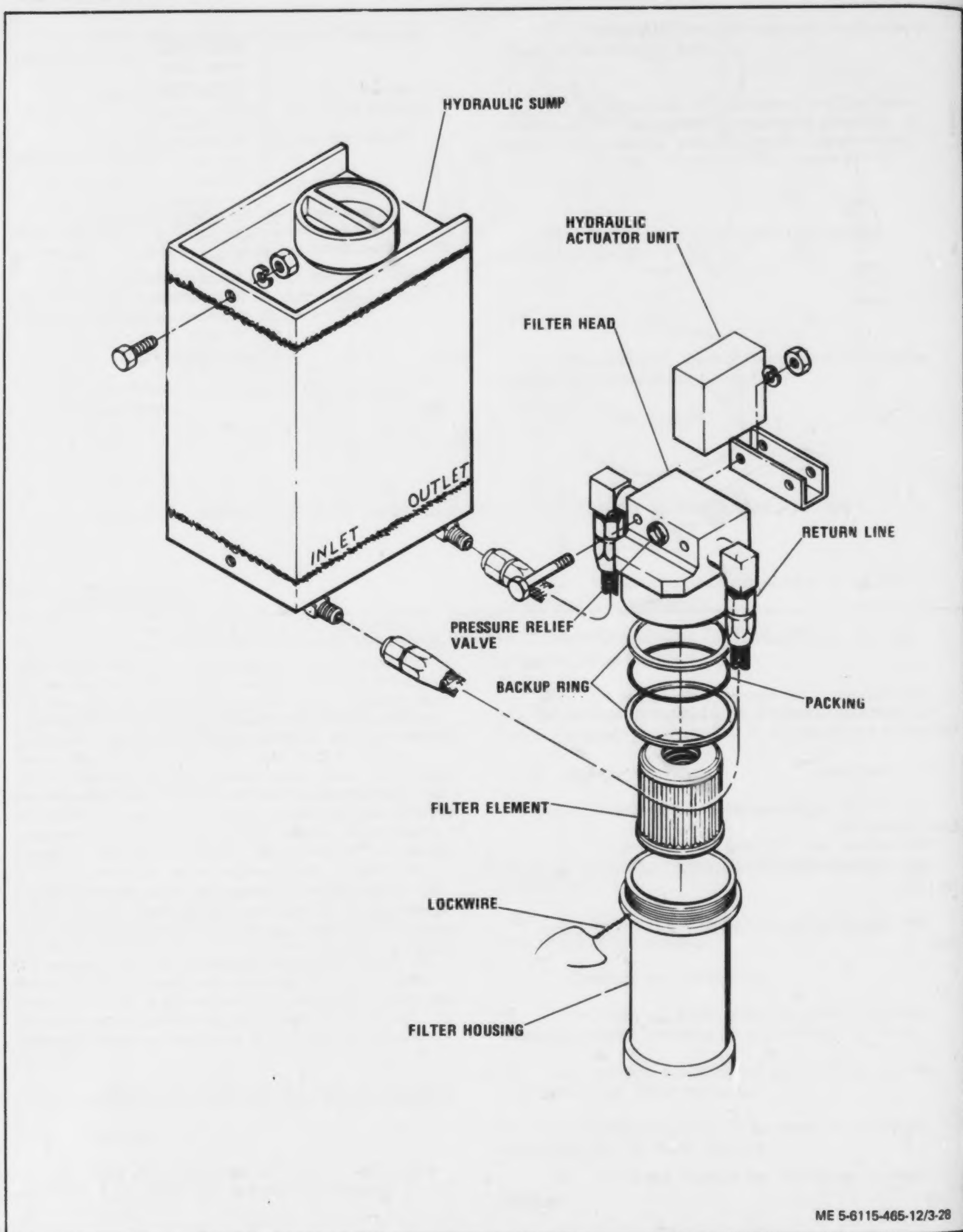

HYDRAULIC SUMP
HYDRAULIC ACTUATOR UNIT
FILTER HEAD
OUTLET
INLET
RETURN LINE
PRESSURE RELIEF VALVE
BACKUP RING
PACKING
FILTER ELEMENT
LOCKWIRE
FILTER HOUSING
ME 5-6115-465-12/3-28

Figure 3-28. Hydraulic Sump and Filter Service

Section XII. ORGANIZATIONAL MAINTENANCE OF THE HYDRAULIC SYSTEM

3-96. GENERAL.

The hydraulic system is used on MEP-104A Precise Generator Sets only. It's function is to provide a means of precise frequency control. The system consists of a sump, a replaceable element type filter, a gear driven positive displacement type pump, a pressure relief valve, a hydraulic actuator and interconnecting lines. The actuator hydraulically operates the governor control linkage to change the governor setting. Changing the governor setting increases or decreases the engine speed causing a corresponding increase or decrease in generator output frequency.

3-97. HYDRAULIC SUMP AND FILTER.

a. Disconnect return line from hydraulic actuator unit and allow the oil to drain into a suitable container (figure 3-28).

NOTE

Drain oil while it is at operating temperature to insure maximum suspension and drainage of particles.

b. Remove lockwire and unscrew filter housing from filter head.

c. Withdraw filter element and discard.

d. Remove and discard packing and back-up rings.

e. Clean filter housing with dry cleaning solvent (Federal Specification P-D-680) and dry with filtered compressed air.

f. Soak replacement filter element in oil conforming to Military Specification MIL-H-5606.

g. Install replacement packing and back-up rings.

h. Insert oil soaked filter element into filter housing and fill housing with clean oil.

i. Apply a thin coating of oil to packing, back-up ring, and threads of filter head and housing.

j. Thread filter housing onto head hand tight and secure with lockwire.

k. Connect return line to hydraulic actuator unit and fill hydraulic sump as directed in paragraph 3-33.

NOTE

No maintenance is required on the pressure relief valve. If the valve is damaged or fails to relieve pressure, replace the valve.

3-98. HYDRAULIC ACTUATOR UNIT FILTER.

a. Disconnect hydraulic hose assembly (figure 3-29).

b. Remove elbow, adapter, and filter.

c. Clean filter with dry cleaning solvent (Federal Specification P-D-680) and dry thoroughly.

d. Inspect filter for holes, tears, and other damage. Replace filter if defects are noted.

e. Install filter and elbow.

f. Install hydraulic hose.

3-99. HYDRAULIC LINES.

a. Removal. Drain hydraulic system (see paragraph 3-97a.). Remove damaged hydraulic lines by following the ascending numerical sequence of index numbers (1 through 16) assigned to figure 3-30.

NOTE

It is not necessary to remove all hydraulic lines to replace a single part. Only those hydraulic lines requiring replacement need be removed.

b. Installation. Install hydraulic lines in reverse order of removal procedures.

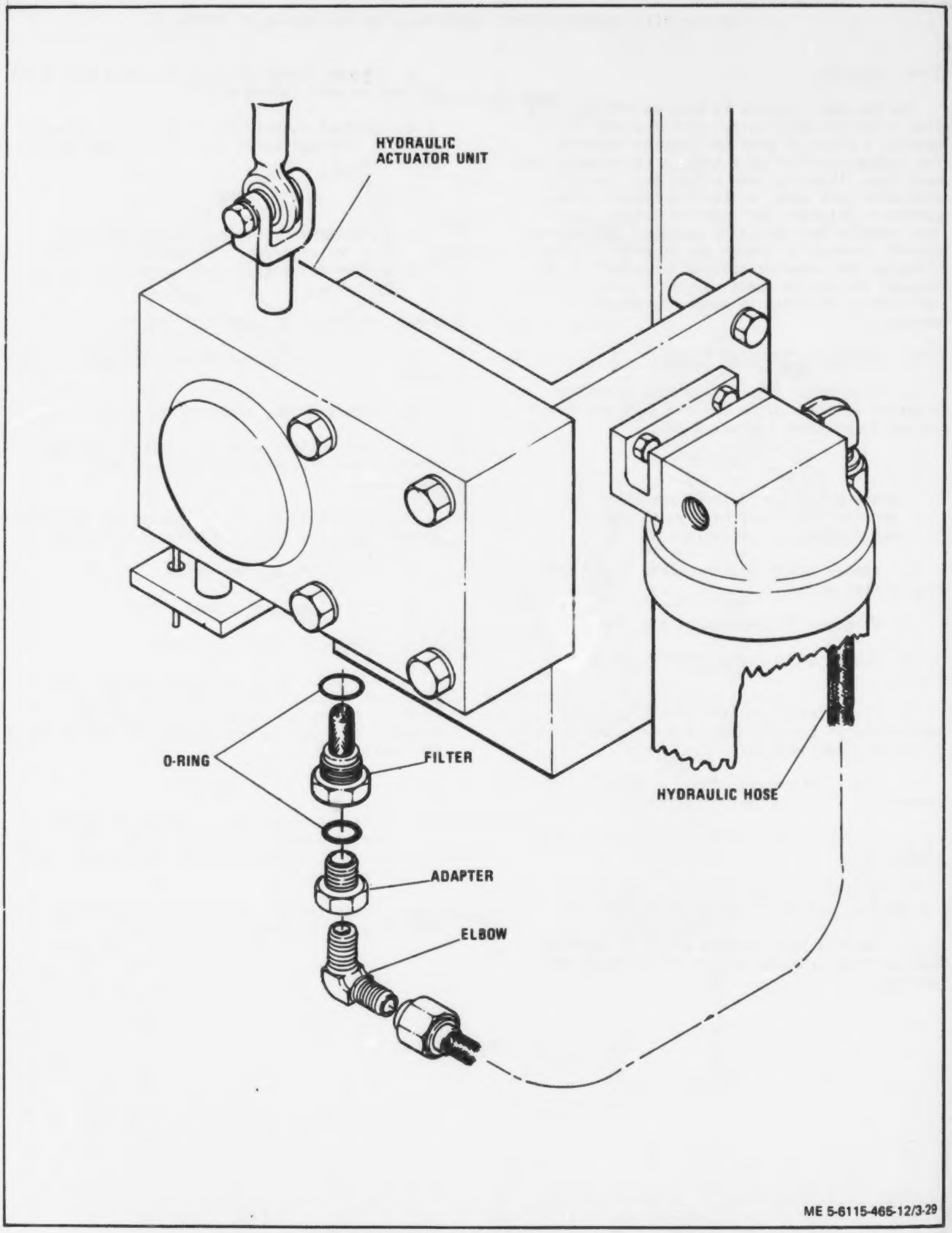
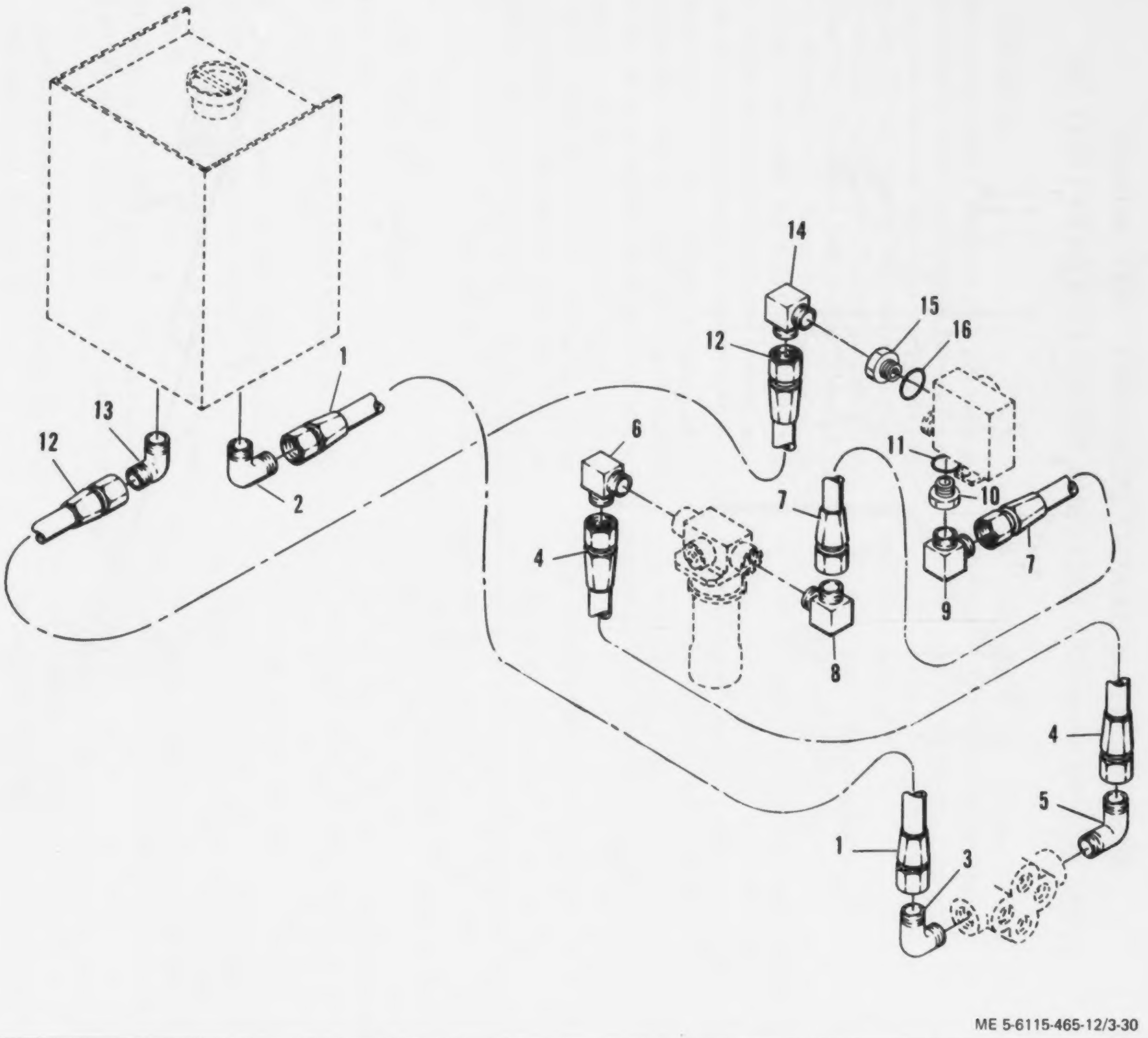

HYDRAULIC ACTUATOR UNIT
O-RING
FILTER
HYDRAULIC HOSE
ADAPTER
ELBOW
ME 5-6115-465-12/3-29

Figure 3-29. Servicing the Hydraulic Actuator Unit Filter

1. Return hose assy
2. Elbow
3. Elbow
4. Hose assy
5. Elbow
6. Elbow
7. Hose assy
8. Elbow
9. Elbow
10. Adapter
11. O-ring
12. Hose assy
13. Elbow
14. Elbow
15. Adapter
16. O-ring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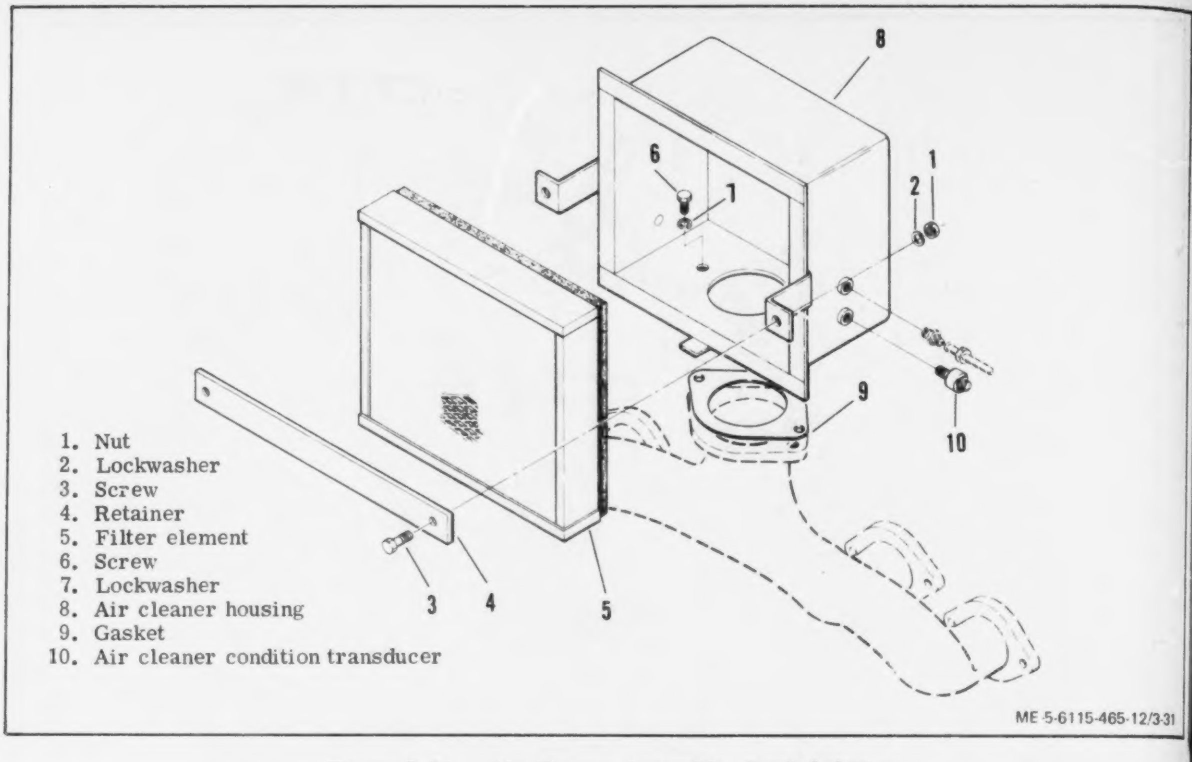
ME 5-6115-465-12/3-30

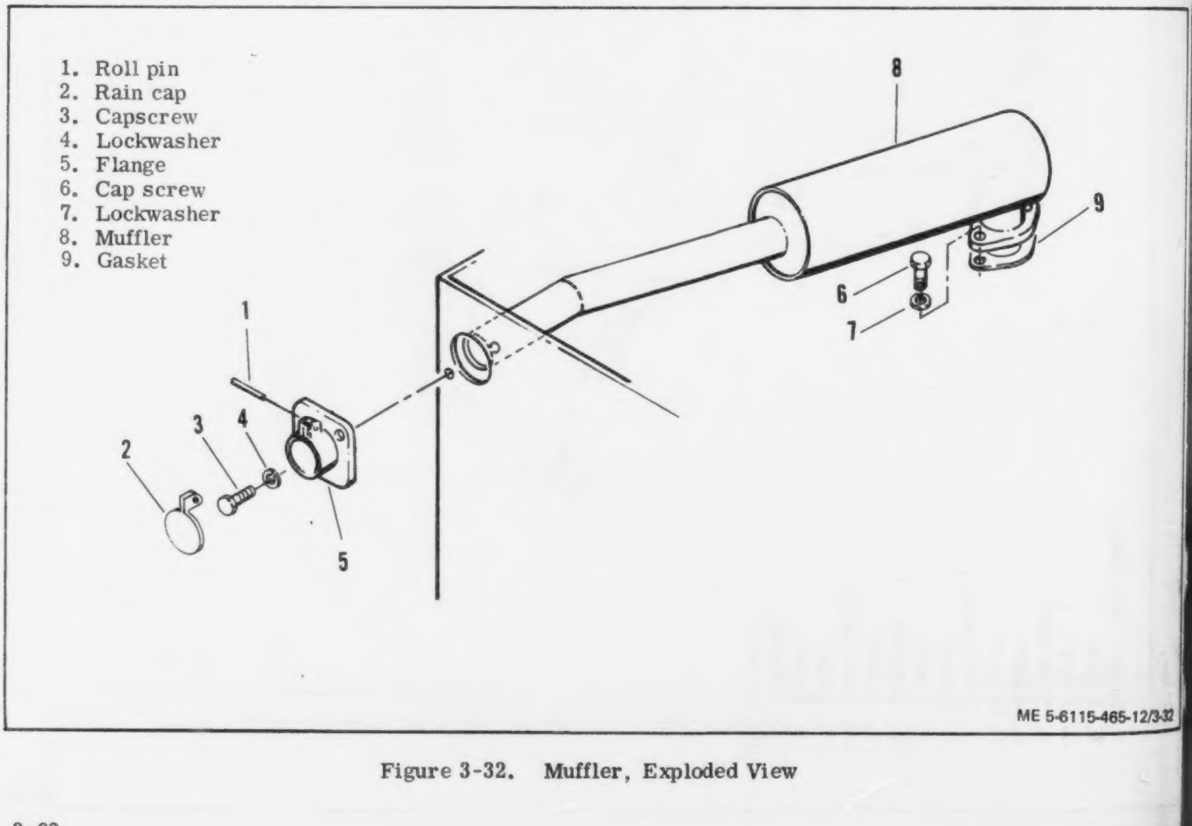
Figure 3-30. Hydraulic Lines and Fittings, Exploded View



1. Nut
2. Lockwasher
3. Screw
4. Retainer
5. Filter element
6. Screw
7. Lockwasher
8. Air cleaner housing
9. Gasket
10. Air cleaner condition transducer

ME 5-6115-465-12/3-31

Figure 3-31. Air Cleaner Assembly, Exploded View



1. Roll pin
2. Rain cap
3. Capscrew
4. Lockwasher
5. Flange
6. Cap screw
7. Lockwasher
8. Muffler
9. Gasket

ME 5-6115-465-12/3-32

Figure 3-32. Muffler, Exploded View

Section XIII. ORGANIZATIONAL MAINTENANCE OF THE INTAKE EXHAUST SYSTEMS AND BREATHER TUBE

3-100. GENERAL.

a. The intake system consists of a dry type air cleaner assembly with a replaceable filter element which removes dust and dirt from the engine combustion air. The air cleaner assembly is equipped with a condition transducer. The air cleaner condition transducer measures the vacuum created by the filter element, but it transmits an electrical impulse which illuminates the AIR CLEANER CONDITION indicator lamp on the engine control panel when the filter element becomes unserviceable.

b. The exhaust system provides a means of expelling exhaust fumes from the engine and muffles much of the noise generated by engine operation.

c. The breather tube provides an escape route for gases which accumulate in the crankcase during engine operation. The gases pass through the breather, located in the engine valve cover, and are expelled into the air cleaner housing through the breather tube.

3-101. AIR CLEANER ASSEMBLY.

a. Removal.

(1) Disconnect electrical leads from air cleaner condition transducer.

(2) Disconnect start aid tube assembly and remove spray nozzle (paragraph 3-84).

(3) Disconnect breather tube assembly (paragraph 3-103).

(4) Remove nuts (1, figure 3-31), lockwashers (2) and screws (3) to remove retainer (4) and filter element (5).

(5) Remove screws (6) and lockwashers (7) to remove housing (8) and gasket (9).

(6) Remove condition transducer (10).

b. Cleaning and Inspection.

(1) Clean filter element as directed in paragraph 3-24.

(2) Clean all other parts with a clean, lint-free cloth moistened with an approved solvent.

(3) Inspect air cleaner housing for dents, cracks, corrosion and other damage.

(4) Inspect air cleaner condition transducer for cracked casing, corrosion, evidence of shorting and other damage.

(5) Check all threaded parts for stripped or otherwise damaged threads.

(6) Replace any parts damaged beyond simple repair.

c. Assembly. Assemble air cleaner assembly in reverse order of disassembly procedures.

d. Installation. Install air cleaner assembly in reverse order of removal procedures.

3-102. MUFFLER.

a. Removal.

(1) Remove roll pin (1, figure 3-32) to remove rain cap (2).

(2) Remove cap screws (3), lockwashers (4) to remove flange (5).

(3) Remove cap screws (6) and lockwashers (7) to remove muffler (8) and gasket (9). Discard gasket.

b. Cleaning and Inspection.

(1) Clean exhaust pipe and muffler with a stiff bristle brush and an approved solvent.

(2) Inspect exhaust pipe and muffler for dents, cracks, excessive corrosion, clogging, and other damage.

(3) Check all threaded parts for stripped or otherwise damaged threads.

(4) Replace any parts damaged beyond simple repair.

c. Installation. Install muffler in reverse order of removal procedures.

d. When a spark arrester is required, the installation procedure will be on the instruction sheet furnished with the spark arrester kit, TM 5-6115-465-24P.

3-103. BREATHER AND BREATHER TUBE.

a. Removal.

(1) Remove clamps (figure 3-33) and breather tube.

(2) Loosen wing nut on breather, unscrew slotted stud and remove breather.

b. Cleaning and Inspection.

(1) Clean breather tube with a clean, lint-free cloth moistened with an approved solvent.

(2) Clean breather with an approved solvent and dry with filtered compressed air.

(3) Inspect breather tube for cracks, corrosion, clogging and other damage.

(4) Check all threaded parts for stripped or otherwise damaged threads.

(5) Replace any parts damaged beyond simple repair.

c. Installation. Install breather and breather tube in reverse order of removal procedures.

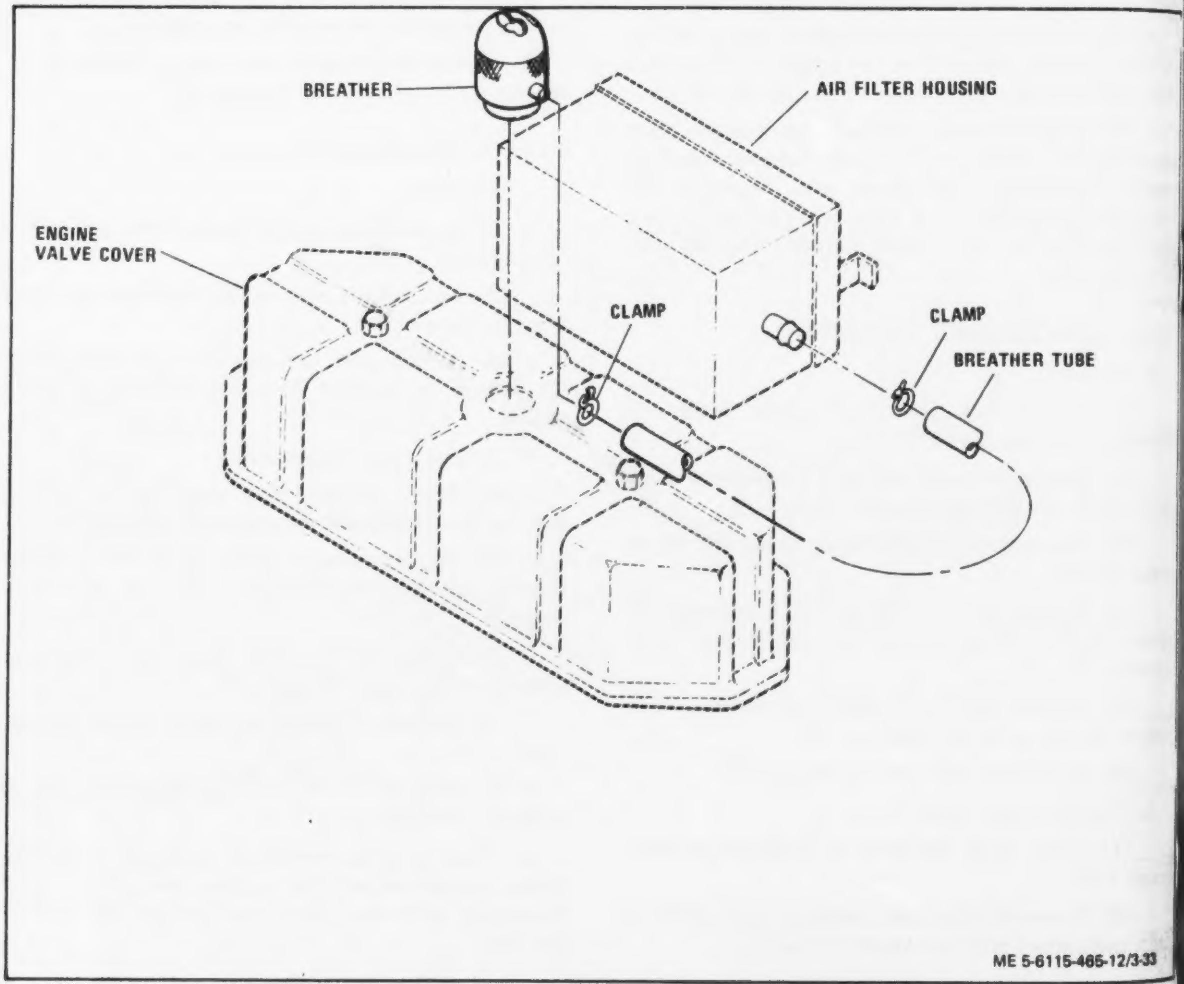

BREATHER
AIR FILTER HOUSING
ENGINE VALVE COVER
CLAMP
CLAMP
BREATHER TUBE
ME 5-6115-465-12/3-33

Figure 3-33. Breather and Breather Tube, Exploded View

Section XIV. ORGANIZATIONAL MAINTENANCE OF THE ENGINE ASSEMBLY

3-104. GENERAL.

Rotational power for driving the generator is developed by a water cooled, six cylinder, four cycle, compression ignition diesel engine. Organizational maintenance of the engine assembly is limited to inspecting the crankshaft pulley, inspecting and replacing the intake and exhaust manifolds, inspecting the rocker arm assembly, adjusting the valve tappet clearance, and testing the engine assembly.

3-105. CRANKSHAFT PULLEY.

a. GENERAL. The crankshaft pulley is mounted on the front end of the engine crankshaft and pulls the drive belt for the water pump, radiator cooling fan, and alternator.

b. Inspection.

(1) Inspect v-belt groove for "step"wear along side and bottom of groove which would indicate excessive wear.

(2) Check for cracks in v-belt groove and around crankshaft hub.

3-106. INTAKE MANIFOLD.

a. Removal.

(1) Refer to paragraph 3-101 and remove air cleaner assembly.

(2) Remove nuts and lockwashers (figure 3-34) to remove intake manifold and gaskets. Discard gaskets.

b. Cleaning and Inspection.

(1) Clean intake manifold with a stiff bristle brush and an approved solvent.

(2) Scrape all gasket remains from the mating surfaces of intake manifold and cylinder head.

(3) Inspect intake manifold for cracks, excessive corrosion and other damage.

(4) Check all threaded parts for stripped or otherwise damaged threads.

c. Installation. Install intake manifold in reverse order of removal procedures. Torque nuts to 35 lbs-ft.

3-107. EXHAUST MANIFOLD.

a. Removal.

(1) Refer to paragraph 3-102 and remove the muffler.

(2) Remove nuts and washers (figure 3-35) to remove exhaust manifold and gaskets. Discard gaskets.

b. Cleaning and Inspection.

(1) Clean exhaust manifold with a stiff bristle brush and an approved solvent.

(2) Scrape all gasket remains from mating surfaces of exhaust manifold and cylinder.

(3) Inspect exhaust manifold for cracks, excessive corrosion and other damage.

(4) Check all threaded parts for stripped or otherwise damaged threads.

c. Installation. Use new gaskets and install exhaust manifold in reverse order of removal procedures. Torque nuts to 35 lbs-ft.

3-108. ROCKER ARM ASSEMBLY.

a. Remove air cleaner assembly (paragraph 3-101).

b. Thoroughly clean the valve cover and surrounding area.

c. Remove capscrews and washers to remove valve cover and gasket. Discard gasket.

d. Inspect valve rocker arm assembly as follows (figure 3-36).

(1) Check adjusting screw, rocker arms, and shaft for cracks and indications of excessive wear.

(2) Inspect springs for distortion, cracks, and breaks.

(3) Check the oil hole in each rocker arm for plugging. Use a small wire and compressed air to clean plugged oil holes.

e. If damage or excessive wear of the rocker arm assembly is present, notify higher level maintenance.

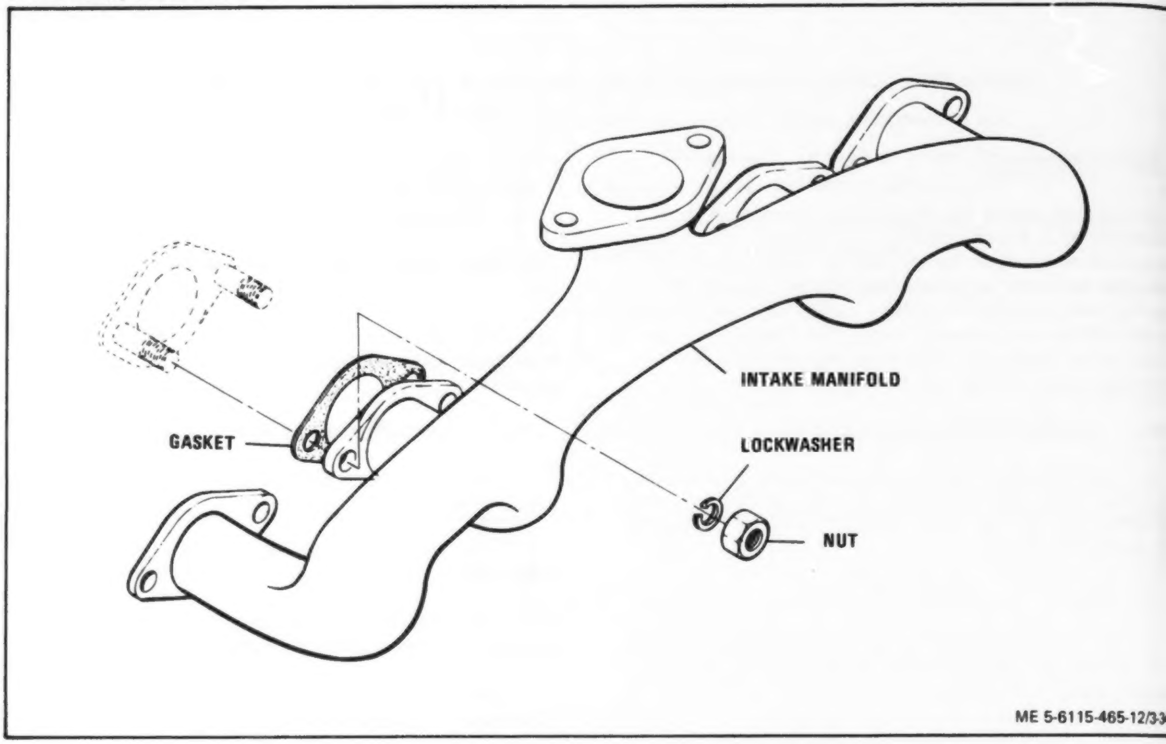

INTAKE MANIFOLD
GASKET
LOCKWASHER
NUT
ME 5-6115-465-12/3-3

Figure 3-34. Intake Manifold, Removal and Installation

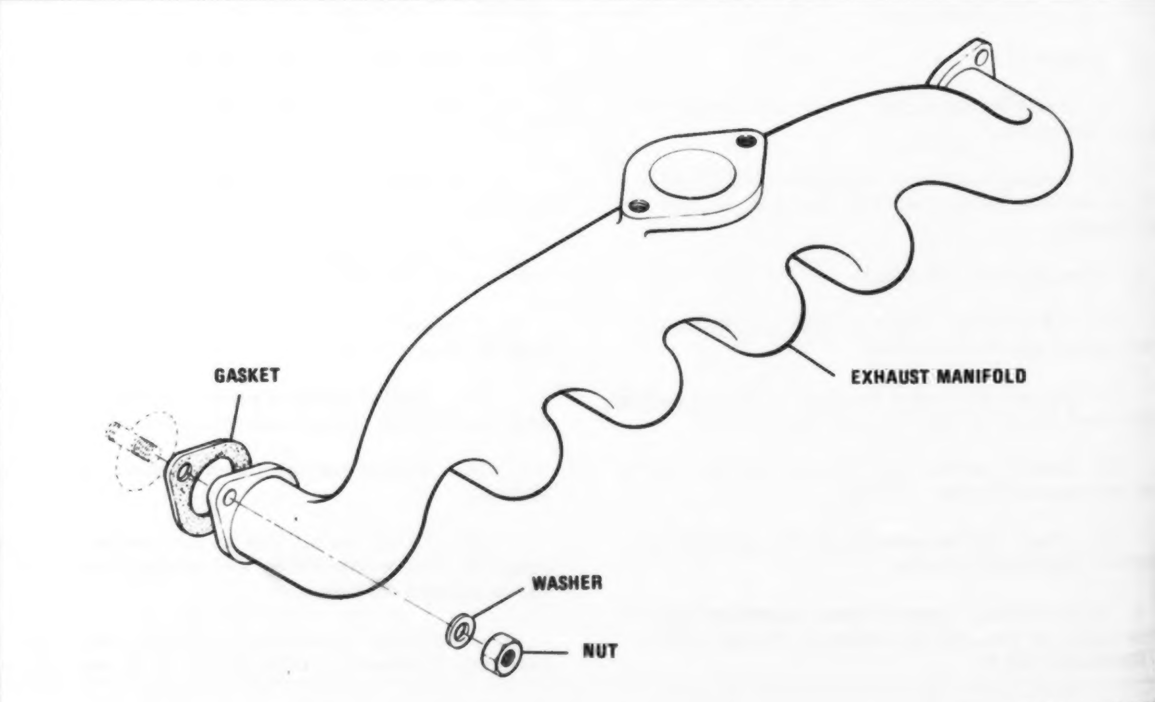

GASKET
EXHAUST MANIFOLD
WASHER
NUT
ME 5-6115-465-12/3

Figure 3-35. Exhaust Manifold, Removal and Installation

f. Install gasket and valve cover and secure with washers and cap screws.

g. Install breather and breather tube.

3-109. Valve Tappet Clearance Adjustment

a. Refer to paragraph 2-10 and operate the engine until the coolant temperature gauge indicates normal operating temperature.

b. Refer to paragraph 3-108 and remove the valve cover.

c. Bar the engine over by hand until both the intake and exhaust valves on No. 1 cylinder are completely closed.

d. Using a feeler gauge, check clearance between the valve stem and the rocker arm on both intake and exhaust valves (figure 3-36). Clearance should be 0.015 hot.

e. If the clearance is not as specified, use a suitable wrench to rotate adjusting screw until proper clearance is obtained.

f. Check and, if necessary, adjust the clearance of the valves on the remaining cylinders as outlined in *c*, *d* and *e* above, following the firing order of 1, 5, 3, 6, 2, 4.

g. When all valves are properly adjusted, refer to paragraph 3-108 and install the valve cover.

3-110. Engine Testing

a. Check that the generator set is properly grounded (paragraph 2-3*d*).

b. Connect a 30 KW load to the load terminal board (paragraph 2-3*e*).

c. Start the engine (paragraph 2-10) and allow it to operate approximately 15 minutes at no load governed speed.

d. Refer to paragraph 2-8 and check that all engine instruments indicate normal operation.

e. Listen for abnormal sounds, such as "knocking", while the engine is operating.

f. Observe the exhaust for excessive smoke.

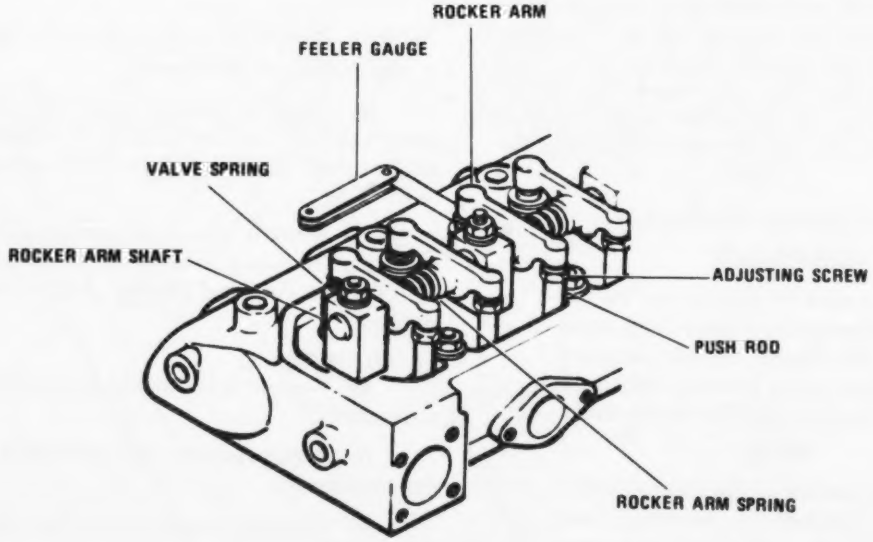


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Figure 3-36. Rocker Arm Assembly Inspection and Valve Tappet Clearance Adjustment

g. Visually check for excessive vibration while the engine operates.

h. Refer to paragraph 2-10 and apply the load to the generator.

i. Repeat *d* through g above.

j. Stop the generator set (para 2-11).

k. If any abnormalities were noted during test operation, refer to table 3-2 for reference to the applicable maintenance paragraph.

l. Test cylinder compression pressure as follows.

(1) Disconnect fuel pump solenoid (pump will be in off position and will not pump fuel).

(2) Refer to paragraph 3-82 and remove fuel injection nozzle holders.

(3) Use fully charged batteries and take readings at cranking speed (150 to 200 RPM).

(4) Do not operate starter more than 15 seconds at a time to prevent overheating of starter. Allow one (1) minute between cranking cycles to allow starter to cool.

(5) Readings on the gage can be used as reference between cylinders. Maximum pressure difference between cylinders is 20 percent. An extremely low reading in any one cylinder would indicate valve, head gasket or piston ring blow-by.

(6) Refer to paragraph 3-82 and install fuel injection nozzle holders.

(7) Connect fuel pump solenoid.

Section XV. ORGANIZATIONAL MAINTENANCE OF THE GENERATOR SET CONTROLS

3-111. General

This paragraph contains organizational maintenance instructions for the generator set controls. The control cubicle assembly and the fault locator panel contain the controls, instruments, and indicators for controlling and monitoring the operation of the generator set. The 400 Hz and 50/60 Hz tactical precise models incorporate a governor control unit which operates the hydraulic actuator to change the governor setting. This function is fulfilled by the manual speed control on the tactical utility model. The interconnecting wiring harness provides electrical connection between the major assemblies and the control cubicle and fault indicator panel.

3-112. Control Cubicle Assembly

WARNING

The generator shall be shut off the the battery disconnected prior to performing maintenance on the control cubicle assembly. Failure to observe this warning may result in electrical shock or death by electrocution.

NOTE

Access to the interior of the control cubicle assembly is obtained by loosening three fasteners at the top of the panel and swinging the panel forward on the hinge at its lower side until its weight is supported by the door holders.

a. Oil Pressure Gauge.

(1) *Removal.*

(a) Tag and remove electrical leads to oil pressure gauge.

(b) Remove nuts (1, figure 3-37), lockwashers (2) and clamp 3.

(c) Remove oil pressure gauge (4) from panel.

(2) *Inspection and cleaning.*

(a) Clean oil pressure gauge with filtered compressed air and a soft bristle brush or wipe with a clean lint-free cloth lightly moistened with an approved solvent.

(b) Visually inspect oil pressure gauge for corrosion, cracked casing, cracked or broken glass, stripped or otherwise damaged threads, and evidence of other damage.

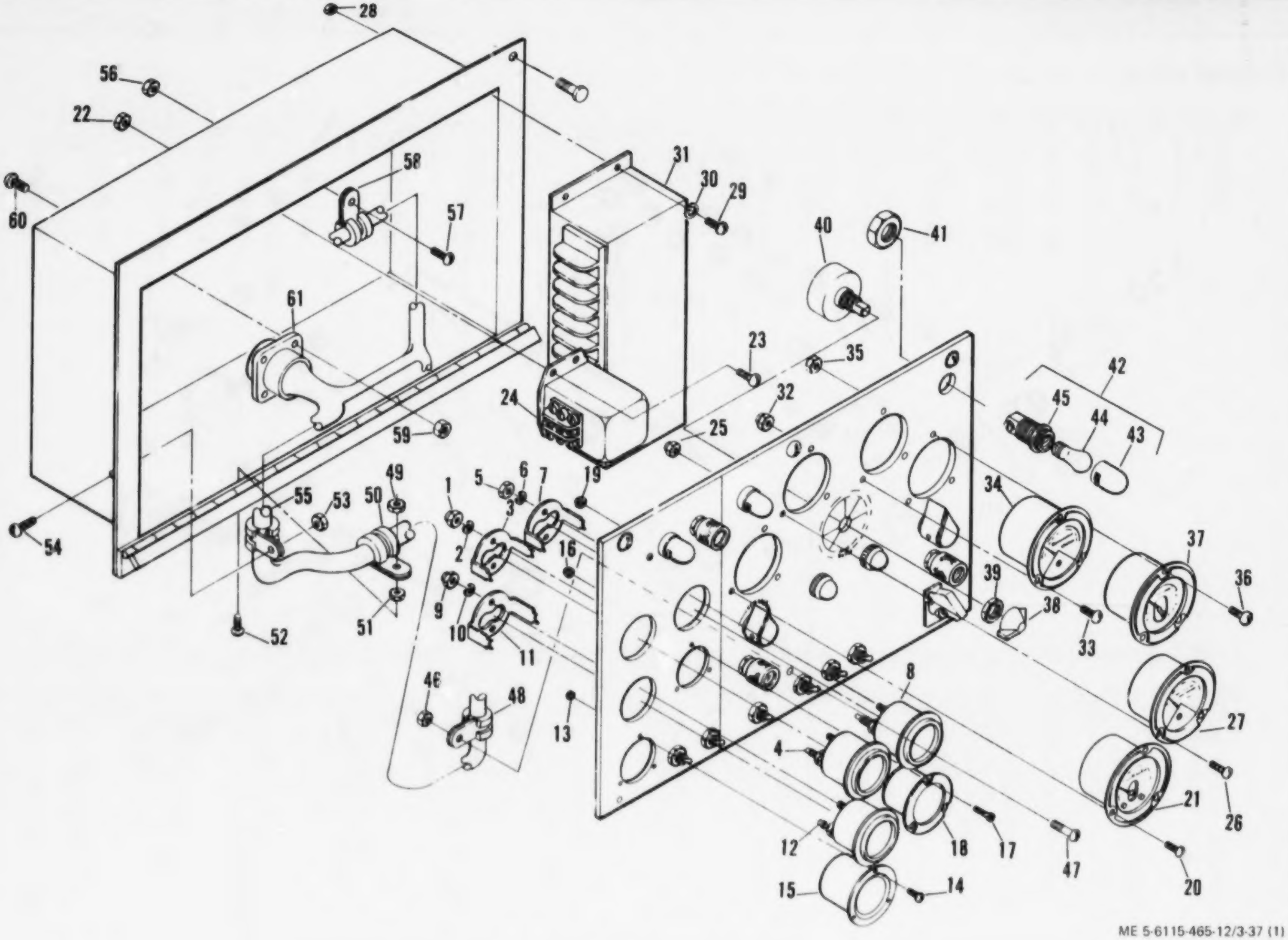
(3) *testing.*

(a) Connect a multimeter across the terminals of a rheostat.

(b) Adjust rheostat until multimeter indicates 30 ohms resistance.

(c) Disconnect multimeter, but do not disturb rheostat adjustment.

(d) Connect rheostat to terminal of oil pressure gauge marked SEND.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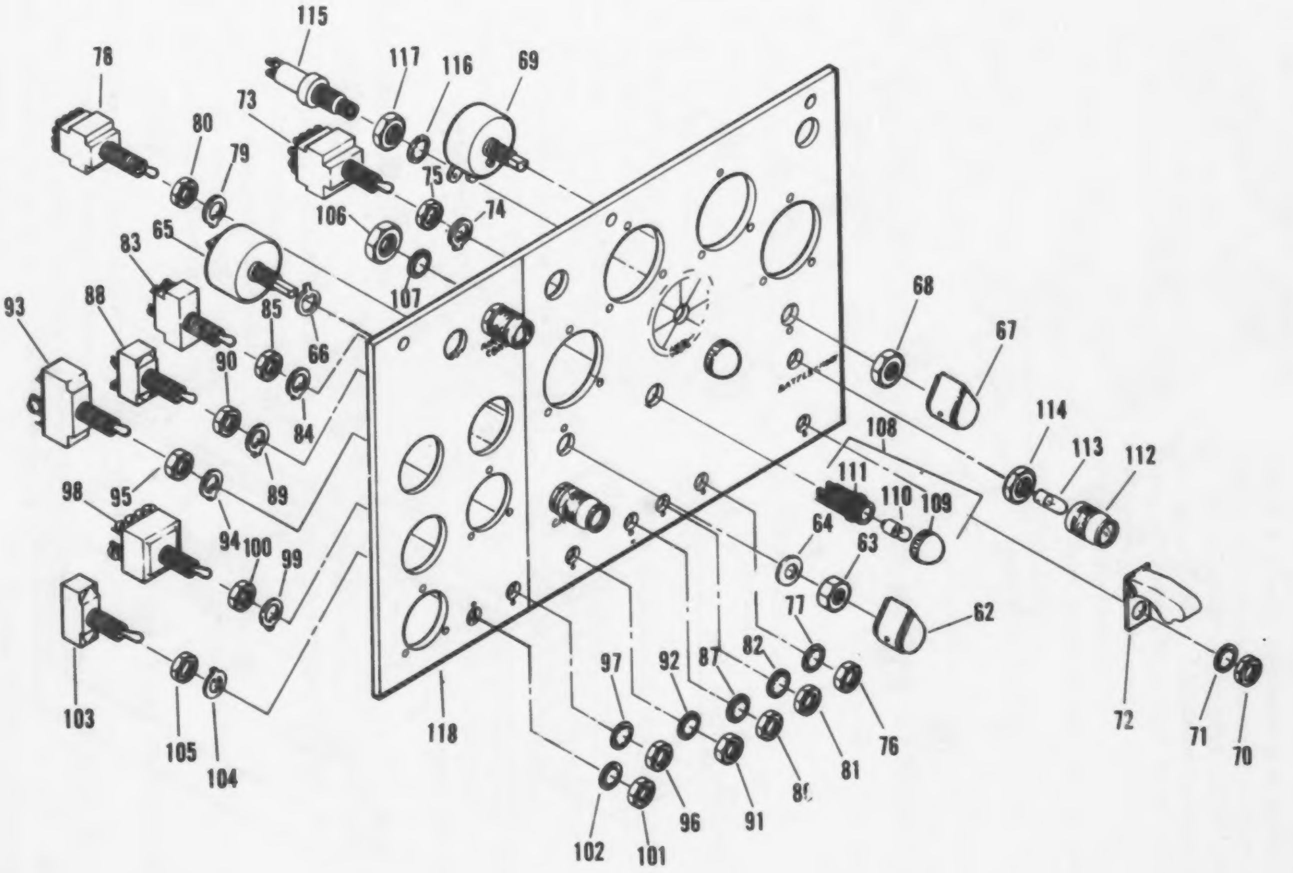
ME 5-6115-464-12/3-37 (1)

Figure 3-37. Control Cubicle Assembly, Exploded View (Sheet 1 of 3)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ME 5-6115-465-12/3-37 (2)

Figure 3-37. Control Cubicle Assembly, Exploded View (Sheet 2 of 3)

1. Nut
2. Lockwasher
3. Clamp
4. Oil pressure gauge
5. Nut
6. Lockwasher
7. Clamp
8. Coolant temperature gauge
9. Nut
10. Lockwasher
11. Clamp
12. Fuel level gauge
13. Self-locking nut
14. Screw
15. Hourmeter
16. Self-locking nut
17. Screw
18. Battery charging ammeter
19. Self-locking nut
20. Screw
21. Frequency meter
22. Self-locking nut
23. Screw
24. Frequency transducer
25. Self-locking nut
26. Screw
27. Kilowatt meter
28. Self-locking nut
29. Screw
30. Washer
31. Thermal watt converter
32. Self-locking nut
33. Screw
34. AC current meter
35. Self-locking nut
36. Screw
37. AC voltmeter
38. Control knob
39. Nut
40. Switch
41. Nut
42. Panel light assembly
43. Cover
44. Lamp
45. Base
46. Self-locking nut
47. Screw
48. Clamp
49. Self-locking nut
50. Clamp
51. Self-locking nut
52. Screw
53. Self-locking nut
54. Screw
55. Clamp
56. Self-locking nut
57. Screw
58. Clamp
59. Self-locking nut
60. Screw
61. Wiring harness assembly
62. Control knob
63. Nut
64. Washer
65. Frequency adjust rheostat
66. Key washer
67. Control knob
68. Nut
69. Voltage adjust rheostat
70. Nut
71. Tooth lockwasher
72. Switch guard
73. Battle short switch
74. Key washer
75. Nut
76. Nut
77. Tooth lockwasher
78. Operations switch
79. Key washer
80. Nut
81. Nut
82. Tooth lockwasher
83. Voltage sensing switch
84. Key washer
85. Nut
86. Nut
87. Tooth lockwasher
88. Panel light switch
89. Key washer
90. Nut
91. Nut
92. Tooth lockwasher
93. Circuit breaker switch
94. Key washer
95. Nut
96. Nut
97. Tooth lockwasher
98. START-RUN-STOP switch
99. Key washer
100. Nut
101. Nut
102. Tooth lockwasher
103. Engine primer switch
104. Key washer
105. Nut
106. Nut
107. Tooth lockwasher
108. Synchronizing light assembly
109. Lens
110. Lamp
111. Base
112. Lens
113. Lamp
114. Nut
115. Base
116. Tooth lockwasher
117. Nut
118. Control cubicle assembly panel

ME 5-6115-465-12/3-37 (3)

Figure 3-37. Control Cubicle Assembly, Exploded View (Sheet 3 of 3)

(e) Connect rheostat and oil pressure gauge in series with a 24 Vdc source with negative lead to oil pressure gauge terminal marked IGN.

(f) Oil pressure gauge should indicate 60 PSI.

(g) Replace oil pressure gauge if it does not function properly.

(4) Installation. Install oil pressure gauge in reverse order of removal procedures.

b. Coolant Temperature Gauge.

(1) Removal.

(a) Tag and disconnect electrical leads to coolant temperature gauge.

(b) Remove nuts (5, figure 3-37, sheet 1 of 3), lockwashers (6) and clamp (7).

(c) Remove coolant temperature gauge (8) from panel.

(2) Cleaning and Inspection.

(a) Clean coolant temperature gauge with filtered compressed air or wipe with a clean, lint-free cloth lightly moistened with an approved solvent.

(b) Visually inspect coolant temperature gauge for corrosion, cracked casing, cracked or broken glass, stripped or otherwise damaged threads, and evidence of other damage.

(3) Testing.

(a) Connect an ohmmeter across the wiper arm terminal and any other terminal of 10-500 ohm potentiometer.

(b) Adjust potentiometer until ohmmeter indicates 460 ohms resistance.

(c) Disconnect ohmmeter but do not disturb potentiometer adjustment.

(d) Connect potentiometer to coolant temperature gauge terminal marked SEND.

(e) Connect potentiometer and coolant temperature gauge in series with a 24 Vdc source with negative lead to temperature gauge terminal marked IGN.

(f) Coolant temperature gauge should indicate 240°F. If it does not, replace it.

(4) Installation. Install coolant temperature gauge in reverse order of removal instructions.

c. Fuel Level Gauge.

(1) Removal.

(a) Tag and disconnect electrical leads to fuel level gauge.

(b) Remove nuts (9, figure 3-37, sheet 1 of 3), lockwashers (10) and clamp (11).

(c) Remove fuel level gauge (12) from panel.

(2) Cleaning and Inspection.

(a) Clean fuel level gauge with filtered compressed air or wipe with a clean, lint-free cloth lightly moistened with an approved solvent.

(b) Visually inspect fuel level gauge for corrosion, cracked casing, cracked or broken glass, stripped or otherwise damaged threads, and evidence of other damage.

(3) Testing.

(a) Connect an ohmmeter across the wiper arm terminal and any other terminal of a potentiometer.

(b) Adjust potentiometer until ohmmeter indicates 30 ohms resistance.

(c) Remove ohmmeter, but do not disturb potentiometer adjustment.

(d) Connect the fuel level gauge in series with a 24 Vdc source with the negative lead to fuel level gauge terminal marked IGN.

(e) Fuel level gauge should indicate EMPTY.

(f) Disconnect 24 Vdc positive lead from fuel level gauge SEND terminal and connect potentiometer adjusted to 30 ohms resistance.

(g) Fuel level gauge should indicate FULL

(h) Replace fuel level gauge if it fails to function properly.

(4) Installation. Install fuel level gauge in reverse order of removal procedures.

d. Hourmeter.

(1) Removal.

(a) Tag and disconnect electrical leads to hourmeter.

(b) Remove self-locking nuts (13, figure 3-37, sheet 1 of 3), and screws (14).

(c) Remove hourmeter (15) from panel.

(2) Cleaning and Inspection.

(a) Clean hourmeter with filtered compressed air or wipe with a clean, lint-free cloth lightly moistened with an approved solvent.

(b) Visually inspect hourmeter for corrosion, cracked casing, cracked or broken glass, stripped or otherwise damaged threads, and evidence of shorting or other damage.

(3) Testing. Connect hourmeter to a 24 Vdc source and observe for proper operation. Replace hourmeter if it fails to operate correctly.

(4) Installation. Install hourmeter in reverse order of removal procedures.

e. Battery Charging Ammeter.

(1) Removal.

(a) Tag and disconnect electrical leads to battery charging ammeter.

(b) Remove self-locking nuts (16, figure 3-37, sheet 1 of 3) and screws (17).

(c) Remove battery charging ammeter (18) from panel.

(2) Cleaning and Inspection.

(a) Clean battery charging ammeter with filtered compressed air or wipe with a clean, lint-free cloth lightly moistened with an approved solvent.

(b) Visually inspect battery charging ammeter for corrosion, cracked casing, cracked or broken glass, evidence of shorting, stripped or otherwise damaged threads and other damage.

(c) Testing. If the battery charging ammeter is suspected of being faulty, temporarily substitute a known functional meter in its place. If the same readings are obtained with the substitute meter, the original is operational and need not be replaced.

(4) Installation. Install battery charging ammeter in reverse order of removal procedures.

f. Frequency Meter.

(1) Removal.

(a) Tag and disconnect electrical leads to frequency meter.

(b) Remove self-locking nuts (19, figure 3-37, sheet 1 of 3) and screws (20).

(c) Remove frequency meter (21) from panel.

(2) Cleaning and Inspection.

(a) Clean frequency meter with filtered compressed air or wipe with a clean, lint-free cloth lightly moistened with an approved solvent.

(b) Visually inspect frequency meter for corrosion, cracked casing, cracked or broken glass, stripped or otherwise damaged threads, evidence of shorting, and other damage.

(3) Installation. Install frequency meter in reverse order of removal procedures.

NOTE

The frequency meter and frequency transducer are matched components and shall be replaced as such.

g. Frequency Transducer.

(1) Removal.

(a) Tag and disconnect electrical leads to frequency transducer.

(b) Remove self-locking nuts (22, figure 3-37, sheet 1 of 3) and screws (23).

(c) Remove frequency transducer (24) from control cubicle.

(2) Cleaning and Inspection.

(a) Clean frequency transducer with filtered compressed air or wipe with a clean, lint-free cloth lightly moistened with an approved solvent.

(b) Visually inspect frequency transducer for dents, cracks, corrosion, and other damage.

(3) Installation. Install frequency transducer in reverse order of removal.

h. Kilowatt Meter.

(1) Removal.

(a) Tag and disconnect electrical leads to kilowatt meter.

(b) Remove self-locking nuts (25, figure 3-37, sheet 1 of 3) and screws (26).

(c) Remove kilowatt meter (27) from panel.

(2) Cleaning and Inspection.

(a) Clean kilowatt meter with filtered

compressed air or wipe with a clean, lint-free cloth lightly moistened with an approved solvent.

(b) Visually inspect kilowatt meter for corrosion, cracked casing, cracked or broken glass, stripped or damaged threads, and evidence of shorting or other damage.

(3) Installation. Install kilowatt meter in reverse order of removal procedures.

i. Thermal Watt Converter.

(1) Removal.

(a) Tag and disconnect electrical leads to thermal watt converter.

(b) Remove self-locking nuts (28, figure 3-37, sheet 1 of 3), screws (29) and washers (30) to remove thermal watt converter (31) from control cubicle assembly.

(2) Cleaning and Inspection.

(a) Clean thermal watt converter with filtered compressed air or wipe with a clean, lint-free cloth lightly moistened with an approved solvent.

(b) Visually inspect thermal watt converter for dents, cracks, corrosion, stripped or otherwise damaged threads, and evidence of shorting or other damage.

(3) Installation. Install thermal watt converter in reverse order of removal procedures.

j. AC Current Meter.

(1) Removal.

(a) Tag and disconnect electrical leads to AC current meter.

(b) Remove self-locking nuts (32, figure 3-37, sheet 1 of 3) and screws (33) to remove AC current meter (34) from panel.

(2) Cleaning and Inspection.

(a) Clean AC current meter with filtered compressed air or wipe with a clean, lint-free cloth lightly moistened with an approved solvent.

(b) Visually inspect AC current meter for corrosion, cracked casing, cracked or broken glass, stripped or otherwise damaged threads and evidence of shorting or other damage.

(3) Installation. Install AC current meter in reverse order of removal procedures.

k. AC Voltmeter.

(1) Removal.

(a) Tag and disconnect electrical leads to AC voltmeter.

(b) Remove self-locking nuts (35, figure 3-37, sheet 1 of 3) and screws (36) to remove AC voltmeter (37).

(2) Cleaning and Inspection.

(a) Clean AC voltmeter with filtered compressed air or wipe with a clean, lint-free cloth lightly moistened with an approved solvent.

(b) Visually inspect AC voltmeter for corrosion, cracked casing, cracked or broken glass, stripped or otherwise damaged threads, and evidence of shorting or other damage.

(3) Testing. If an AC voltmeter is suspected of being faulty, test by temporarily replacing with another which is known to be serviceable. If the incorrect reading persists, the original meter is serviceable and should be reinstalled.

(4) Installation. Install AC voltmeter in reverse order of removal procedures.

l. Volts-Amps Transfer Switch.

(1) Removal.

(a) Tag and disconnect electrical leads to volts-amps transfer switch.

(b) Loosen setscrews in control knob (38, figure 3-37, sheet 1 of 3) and remove knob.

(c) Remove nut (39) to remove switch (40) from panel.

(2) Cleaning and Inspection.

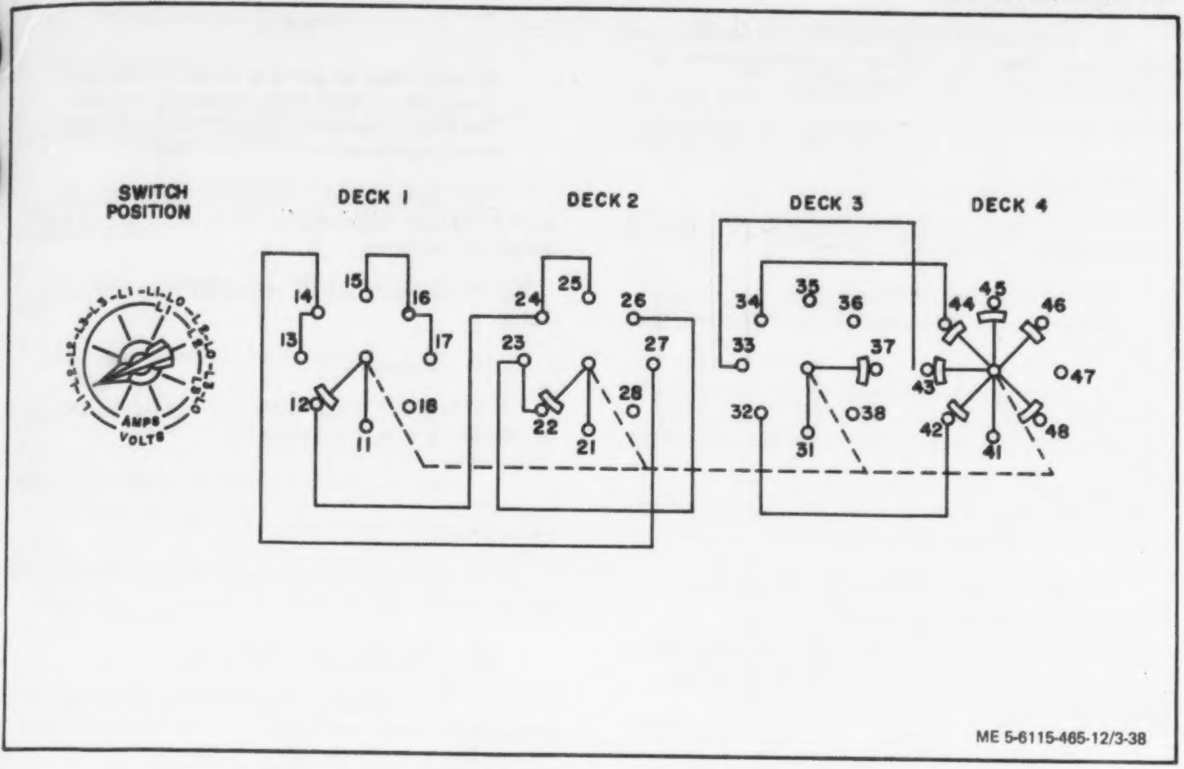
(a) Clean volts-amps transfer switch with filtered compressed air or wipe with a clean, lint-free cloth lightly moistened with an approved solvent.

(b) Visually inspect volts-amps transfer switch for cracked casing, corrosion, stripped or otherwise damaged threads, and evidence of shorting or other damage.

(3) Testing.

(a) Rotate switch shaft counterclockwise as far as it will go. This places switch in L1-L2 volts position.

(b) Check switch for continuity with a multimeter using schematic of figure 3-38 as a guide.


SWITCH POSITION
L1-L2
L2-L3
L3-L1
L1-L0
L2-L0
L3-L0
L1
L2
L3
AMPS
VOLTS
DECK 1
DECK 2
DECK 3
DECK 4
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ME 5-6115-465-12/3-38

Figure 3-38. Volts-Amps Transfer Switch Schematic Diagram

(c) Rotate switch shaft clockwise to the next position and again check switch continuity.

NOTE

The wiper contacts shown in figure 3-38 rotate clockwise to the next set of stationary contacts when the switch shaft is rotated clockwise to the next position.

(d) Continue rotating switch shaft and checking continuity until all six positions have been checked.

(e) If a discontinuity is noted in any switch position, switch is unserviceable and shall be replaced.

(4) Installation. Install volts-amps transfer switch in reverse order of removal procedures.

m. Panel Light Assemblies.

(1) Removal and Disassembly.

(a) Tag and disconnect electrical leads to panel light assemblies.

(b) Remove nut (41, figure 3-37, sheet 1 of 3) to remove panel light assemblies (42).

(c) Remove covers (43) and unscrew lamps (44) from bases (45).

(2) Cleaning and Inspection.

(a) Clean panel light assemblies with filtered compressed air and a soft bristle brush or wipe with a clean, lint-free cloth lightly moistened with an approved solvent.

(b) Visually inspect base for corrosion, cracks, stripped or otherwise damaged threads, and evidence of shorting or other damage.

(c) Visually inspect lamp for corrosion, burned out filament, and stripped or otherwise damaged threads.

(d) Visually inspect covers for cracks, corrosion, stripped or damaged threads and other damage.

(e) Replace any damaged or defective parts.

(3) Assembly and Installation. Assemble and install panel light assemblies in reverse order of removal and disassembly procedures.

n. Control Cubicle Wiring Harness Assembly.

(1) Removal.

(a) Tag and disconnect electrical leads to control cubicle assembly.

(b) Remove self-locking nut (46, figure 3-37, sheet 1 of 3) and screw (47) to remove clamp (48).

(c) Remove self-locking nut (49) to remove clamp (50). Do not remove self-locking nut (51) and screw (52) unless replacement is necessary.

(d) Remove self-locking nut (53) and screw (54) to remove clamp (55).

(e) Remove self-locking nut (56) and screw (57) to remove clamp (58).

(f) Remove self-locking nut (59) and screws (60) to remove wiring harness assembly (61).

(2) Cleaning and Inspection.

(a) Clean wiring harness assembly with filtered compressed air and a soft bristle brush or wipe with a clean, lint-free cloth lightly moistened with an approved solvent.

(b) Visually inspect wiring harness connector for cracks, corrosion, bent or broken pins, and stripped or damaged threads.

(c) Inspect insulation for burns, chafing, and deterioration.

(d) Check electrical leads for burned, bent, corroded, damaged or missing terminals.

(3) Testing. Check continuity of individual wires with a multimeter or continuity light using figures FO-1 and FO-2 as a guide.

CAUTION

Do not use acid core solder on electrical wiring. See appropriate manual in Appendix A for wiring installation practices.

(4) Repair. Replace damaged wires, terminals, and connector by unsoldering connections, installing replacement parts and soldering connections.

NOTE

If more than 30 percent of the wires are damaged or have been repaired, replace the wiring harness and forward it to high level maintenance for rebuilding.

(5) Installation. Install control cubicle wiring harness assembly in reverse order of removal procedures.

o. Frequency Adjust Rheostat (Precise Sets Only).

(1) Removal.

(a) Tag and disconnect electrical leads to frequency adjust rheostat.

(b) Loosen setscrew in control knob (62, figure 3-37, sheet 2 of 3), then remove knob from rheostat shaft.

(c) Remove nut (63), washer (64) and keyed washer (66) to remove rheostat from panel.

(2) Cleaning and Inspection.

(a) Clean rheostat with filtered compressed air and a soft bristle brush or wipe with a clean, lint-free cloth lightly moistened with an approved solvent.

(b) Visually inspect rheostat for cracked casing, corrosion, stripped or otherwise damaged threads, and evidence of shorting or other damage.

(3) Testing.

(a) Connect an ohmmeter across outer terminals of rheostat. Ohmmeter should indicate 500 ohms resistance.

(b) Rotate rheostat shaft counterclockwise as far as it will go.

(c) Connect ohmmeter between center terminal and either outer terminal. Ohmmeter should indicate 0 ohms resistance.

(d) Slowly, at an even rate, rotate the rheostat shaft clockwise as far as it will go. Ohmmeter should increase at an even rate from 0 to 500 ohms.

(e) If ohmmeter indication changes irratically or is not 500 ohms when the rotation is completed, the rheostat is defective and shall be replaced.

(4) Installation. Install frequency adjust rheostat in reverse order of removal procedures.

p. Voltage Adjust Rheostat.

(1) Removal.

(a) Tag and disconnect electrical leads to voltage adjust rheostat.

(b) Loosen setscrew in control knob (67, figure 3-37, sheet 2 of 3) and remove knob from rheostat shaft.

(c) Remove nut (68) to remove rheostat (69).

(2) Cleaning and Inspection.

(a) Clean voltage adjust rheostat with filtered compressed air and a soft bristle brush or wipe with a clean, lint-free cloth lightly moistened with an approved solvent.

(b) Visually inspect rheostat for cracked casing, corrosion, stripped or otherwise damaged threads, and evidence of shorting or other damage.

(3) Testing.

(a) Connect an ohmmeter across two outer terminals of rheostat. Indication shall be 250 ohms resistance.

(b) Rotate rheostat shaft counterclockwise as far as it will go.

(c) Connect ohmmeter between center terminal and either outer terminal.

(d) Slowly, at an even rate, rotate rheostat shaft clockwise as far as it will go while observing the ohmmeter.

(e) Ohmmeter indication shall increase, at an even rate, from 0 to 250 ohms resistance.

(f) If ohmmeter indication changes irratically, or is not 250 ohms when rotation is complete, the rheostat is defective and shall be replaced.

(4) Installation. Install voltage adjust rheostat in reverse order of removal procedures.

q. Battle Short Switch.

(1) Removal.

(a) Tag and disconnect electrical leads to battle short switch.

(b) Remove nut (70, figure 3-37, sheet 2 of 3) and tooth lockwasher (71) to remove switch guard (72), battle short switch (73) and key washer (74).

(c) Do not remove nut (75) unless inspecttion reveals damage and replacement is necessary.

(2) Cleaning and Inspection.

(a) Clean switch and switch guard with filtered compressed air and a soft bristle brush or wipe with a clean, lint-free cloth lightly moistened with an approved cleaning solvent.

(b) Visually inspect switch for cracked casing, corrosion, stripped or otherwise damaged threads, and evidence of shorting or damage.

(c) Check switch guard for cracks, breaks, and other damage.

(3) Testing.

(a) Place switch in ON position (lever away from switch mounting bushing key way).

(b) Using an ohmmeter, check for continuity between each center terminal and the corresponding upper terminal.

(c) Place switch in OFF position.

(d) Check for continuity between each center terminal and corresponding lower terminal.

(e) Replace switch if any discontinuity is noted.

(4) Installation. Install battle short switch in reverse order of removal procedures.

r. Operations Switch.

(1) Removal.

(a) Tag and disconnect electrical leads to operations switch.

(b) Remove nut (76, figure 3-37, sheet 2 of 3) and tooth lockwasher (77), to remove operations switch (78) and key washer (79). Do not remove nut (80), unless inspection reveals damage and replacement is necessary.

(2) Cleaning and Inspection.

(a) Clean switch with filtered compressed air and a soft bristle brush or wipe with a clean, lint-free cloth lightly moistened with an approved cleaning solvent.

(b) Visually inspect switch for cracked casing, corrosion, stripped, or otherwise damaged threads, and evidence of shorting or other damage.

(3) Testing.

(a) Place switch in PARALLEL OPERATION position (lever away from mounting post key way).

(b) Using an ohmmeter, check for continuity between each center terminal and corresponding upper terminal.

(c) Place switch in SINGLE UNIT OPERATION position (lever toward mounting post key way).

(d) Check for continuity between each center terminal and corresponding lower terminal.

(e) Replace switch if any discontinuity is noted.

(4) Installation. Install operations switch in reverse order of removal procedures.

s. Voltage Sensing Switch.

(1) Removal.

(a) Tag and disconnect electrical leads to switch.

(b) Remove nut (81, figure 3-37, sheet 2 of 3) and tooth lockwasher (82) to remove switch (83) and key washer (84). Do not remove nut (85) from switch.

(2) Cleaning and Inspection.

(a) Clean switch with filtered compressed air and a soft bristle brush or wipe with a clean, lint-free cloth lightly moistened with an approved solvent.

(b) Visually inspect switch for cracked casing, corrosion, stripped or otherwise damaged threads, and evidence of shorting or other damage.

(3) Testing.

(a) Place voltage sensing switch in REMOTE position (lever away from mounting post key way).

(b) Using an ohmmeter, check for continuity between center terminal and corresponding upper terminal.

(c) Place switch in LOCAL position (lever toward mounting post key way).

(d) Check for continuity between each center terminal and corresponding lower terminal.

(e) Replace switch if any discontinuity is noted.

(4) Installation. Install voltage sensing switch in reverse order of removal procedures.

t. Panel Light Switch.

(1) Removal.

(a) Tag and disconnect electrical leads to switch.

(b) Remove nut (86, figure 3-37, sheet 2 of 3) and tooth lockwasher (87) to remove switch (88) and key washer (89).

(c) Do not remove nut (90) from switch.

(2) Cleaning and Inspection.

(a) Clean switch with filtered compressed air and a soft bristle brush or wipe with a clean, lint-free cloth lightly moistened with an approved solvent.

(b) Visually inspect switch for cracked casing, corrosion, stripped or otherwise damaged threads, and evidence of shorting or other damage.

(3) Testing.

(a) Place switch in OFF position (lever toward mounting post key way).

(b) Using an ohmmeter, check for open circuit across switch terminals.

(c) Place switch in ON position (lever away from key way).

(d) Check for continuity across switch terminals.

(e) Replace switch if it fails to function properly.

(4) Installation. Install panel light switch in reverse order of removal procedures.

u. Circuit Breaker Switch.

(1) Removal.

(a) Tag and disconnect elecrical leads to switch.

(b) Remove nut (91, figure 3-37, sheet 2 of 3) and tooth lockwasher (92) to remove switch (93) and key washer (94).

(c) Do not remove nut (95) unless inspection reveals damage and replacement is necessary.

(2) Cleaning and Inspection

(a) Clean switch with filtered compressed air and a soft bristle brush or wipe with a clean, lint-free cloth lightly moistened with an approved solvent.

(b) Visually inspect switch for cracked casing, corrosion, stripped or otherwise damaged threads and evidence of shorting or other damage.

(3) Testing.

(a) Place switch in OPEN position (lever toward mounting post key way).

(b) Using an ohmmeter, check for continuity between terminals 1 and 2 and between terminals 4 and 5 (figures FO-1 and FO-2).

NOTE

Terminal markings are also on the switch.

(c) Place switch in the CLOSED position (lever away from mounting post key way).

(d) Using an Ohmmeter, check for continuity between terminals 2 and 3 and between terminals 5 and 6.

(e) Place switch in center position.

(f) Using an Ohmmeter, check for continuity between terminals 1 and 2 and between 5 and 6.

(g) Replace switch if it fails any of the above tests.

(4) Installation. Install circuit breaker switch in reverse order of removal procedures.

v. START-RUN-STOP switch.

(1) Removal.

(a) Tag and disconnect electrical leads to switch.

(b) Remove nut (96, figure 3-37, sheet 2 of 3) and tooth lockwasher (97) to remove switch (98) and key washer (99).

(c) Do not remove nut (100) unless inspection reveals damage and replacement is necessary.

(2) Cleaning and Inspection.

(a) Clean switch with filtered compressed air and a soft bristle brush or wipe with a clean, lint-free cloth lightly moistened with an approved solvent.

(b) Visually inspect switch for cracked casing, corrosion, stripped or otherwise damaged threads, and evidence of shorting or other damage.

(3) Testing.

(a) Place switch in STOP position (lever toward mounting post key way).

(b) Using an ohmmeter, check for open circuit between terminals 2 and 3, 5 and 6, 8 and 9, and 11 and 12 (figures FO-1 and FO-2). All circuits shall be open.

(c) Place switch in RUN position.

(d) Check for continuity between terminals 2 and 3 and terminals 8 and 9. Both circuits shall have continuity.

(e) Check for open circuit between terminals 5 and 6.

(f) Place switch in START position (lever away from mounting post kev way).

(g) Check for continuity between terminals 2 and 3, 5 and 6, 8 and 9 and 11 and 12. All circuits shall indicate continuity.

(h) Replace switch if it fails any of the above tests.

(4) Installation. Install START-RUN-STOP switch in reverse order of removal procedures.

w. Engine Primer Switch.

(1) Removal.

(a) Tag and disconnect electrical leads to ENGINE PRIMER switch.

(b) Remove nut (101, figure 3-37, sheet 2 of 3) and tooth lockwasher (102) to remove switch (103) and key washer (104).

(c) Do not remove nut (105) unless inspection reveals damage and replacement is necessary.

(2) Cleaning and Inspection.

(a) Clean switch with filtered compressed air and a soft bristle brush or wipe with a clean, lint-free cloth lightly moistened with an approved solvent.

(b) Visually inspect switch for cracked casing, corrosion, stripped or otherwise damaged threads, and evidence of shorting or other damage.

(3) Testing.

(a) Using an ohmmeter, check for open circuit across terminals. Ohmmeter shall indicate open circuit.

(b) Hold switch lever in ON position (toward mounting post key way) and check ohmmeter indication. Ohmmeter shall indicate continuity.

(c) Replace switch if it fails either of the above tests.

(4) Installation. Install switch in reverse order of removal procedures.

x. Synchronizing Light Assemblies.

(1) Removal and Disassembly.

(a) Tag and disconnect electrical leads to synchronizing light assemblies.

(b) Remove nuts (106, figure 3-37, sheet 2 of 3) and tooth lockwashers (107) to remove syncrhronizing light assemblies (108).

(c) Unscrew lens (109). Depress lamps (110) and rotate counterclockwise to remove from bases (111).

(2) Cleaning and Inspection.

(a) Clean synchronizing light assemblies with filtered compressed air and a soft bristle brush or wipe with a clean, lint-free cloth lightly moistened with an approved solvent.

(b) Visually inspect bases for cracks, corrosion, stripped or otherwise damaged threads, and evidence of shorting.

(c) Inspect lens for cracks, breaks, and stripped or otherwise damaged threads.

(d) Inspect lamps for corrosion, cracked or broken glass, and burned out filament.

(e) Replace any damaged or defective parts.

(3) Assembly and Installation. Assemble and install synchronizing light assemblies in reverse order of removal and disassembly procedures.

y. Air Cleaner Condition, Circuit Breaker and Battle Short Indicator Light Assemblies.

(1) Removal.

(a) Tag and disconnect electrical leads to indicator light assemblies.

(b) Remove lens (112, figure 3-37, sheet 2 of 3). Press in and rotate counterclockwise to remove lamps (113).

(c) Remove nuts (114) to remove bases (115), and tooth lockwashers (116) from control cubicle assembly panel (118).

(d) Do not remove nuts (117) unless inspection reveals damage and replacement is necessary.

(2) Cleaning and Inspection.

(a) Clean indicator light assembly with filtered compressed air and a soft bristle brush or wipe with a clean, lint-free cloth lightly moistened with an approved solvent.

(b) Visually inspect base for cracks, corrosion, stripped or otherwise damaged threads, and evidence of shorting.

(c) Inspect lamp for cracked or broken glass, corrosion, and burned out filament.

(d) Check lens for cracked or broken glass, cracks, and stripped or otherwise damaged threads.

(e) Replace any damaged or defective parts.

(3) Installation. Install indicator light assembly in reverse order of removal procedures.

NOTE

Air cleaner condition and battle short indicator lights have red lens. Circuit breaker indicator light has amber lens.

3-113. FAULT LOCATING INDICATOR.

a. Inspection. Inspect fault locating indicator for cracks, corrosion, cracked or broken indicator light lens, missing hardware and other damage.

b. Testing. Depress test or reset switch and check that all indicator lights are lit.

c. Lamp Replacement.

(1) Unscrew lens (figure 3-39) and remove lamp.

(2) Visually inspect lamp for corrosion, cracked or broken glass, and burned out filament.

(3) Replace lamp if defective.

(4) Install lamps and lens.

d. Fuse Replacement.

(1) Unscrew cap (figure 3-39) and remove fuse.

(2) Visually inspect fuse for corrosion, cracked or broken glass, and melted conductor.

(3) Replace fuse if defective.

(4) Install fuse and cap.

e. Removal.

(1) Disconnect wiring harness from back of fault locating indicator.

(2) Remove screws (1, figure 39.1) and lockwashers (2) to remove fault locating indicator from generator set.

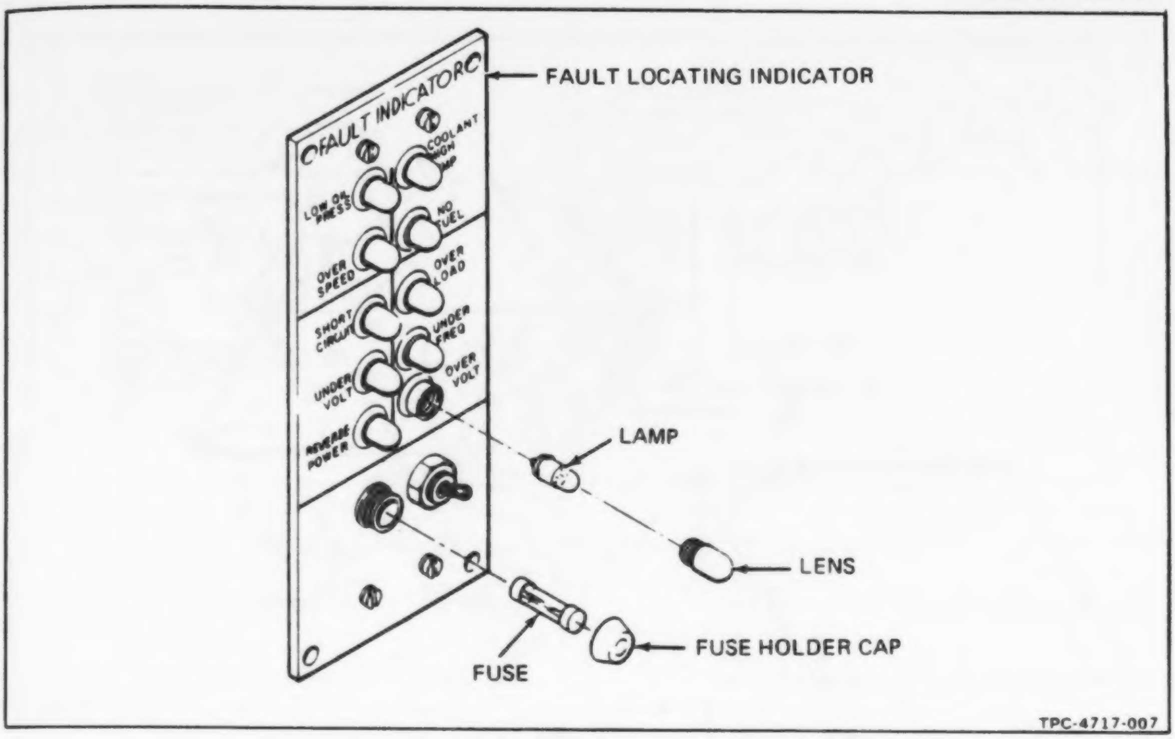
FAULT LOCATING INDICATOR
FAULT INDICATOR
LOW OIL PRESS
COOLANT HIGH TEMP
NO FUEL
OVER SPEED
OVER LOAD
SHORT CIRCUIT
UNDER FREQ
UNDER VOLT
OVER VOLT
REVERSE POWER
LAMP
LENS
FUSE
FUSE HOLDER CAP
TPC-4717-007

Figure 3-39. Fault Locating Indicator Lamp and Fuse Replacement

f. Disassembly.

(1) Remove screw and captive washer assemblies (3) and cover plate (4).

(2) Remove screw and captive washer assemblies (5) and carefully pull indicator panel assembly (6) away from housing. Tag and disconnect electrical leads.

(3) Disassemble panel assembly (items 7 through 24) only as is necessary for replacement of damaged or defective components.

(4) Remove screw and captive washer assemblies (25) to remove cover plate assembly (26). Tag and disconnect electrical leads.

(5) Disassemble cover plate assembly (items 27 through 32) only as is necessary for testing and replacement of components.

(6) Remove screw and captive washer assemblies (33) to remove wiring harness (34) from housing (35).

g. Installation. Install fault locating indicator assembly in reverse order of disassembly and removal procedures.

3-114. MANUAL SPEED CONTROL

a. Inspection.

(1) Inspect manual speed control knob (figure 3-40) for cracks, breaks, and other damage and condition of boot.

(2) Inspect control cable assembly for corrosion, pinched, frayed, or otherwise damaged cable, pinched or damaged housing, insecure mounting, and stripped or otherwise damaged adjusting threads.

b. Testing.

(1) On precise models of the generator set, the manual speed control must be connected as follows:

(a) Push manual speed control all the way in.

(b) Insert manual speed control cable through sleeve of fuel injection pump manual throttle control arm (figure 3-40).

(c) Install and tighten adjustment screw.

(d) Install lockwire.

(2) Check manual speed control for unrestricted movement.

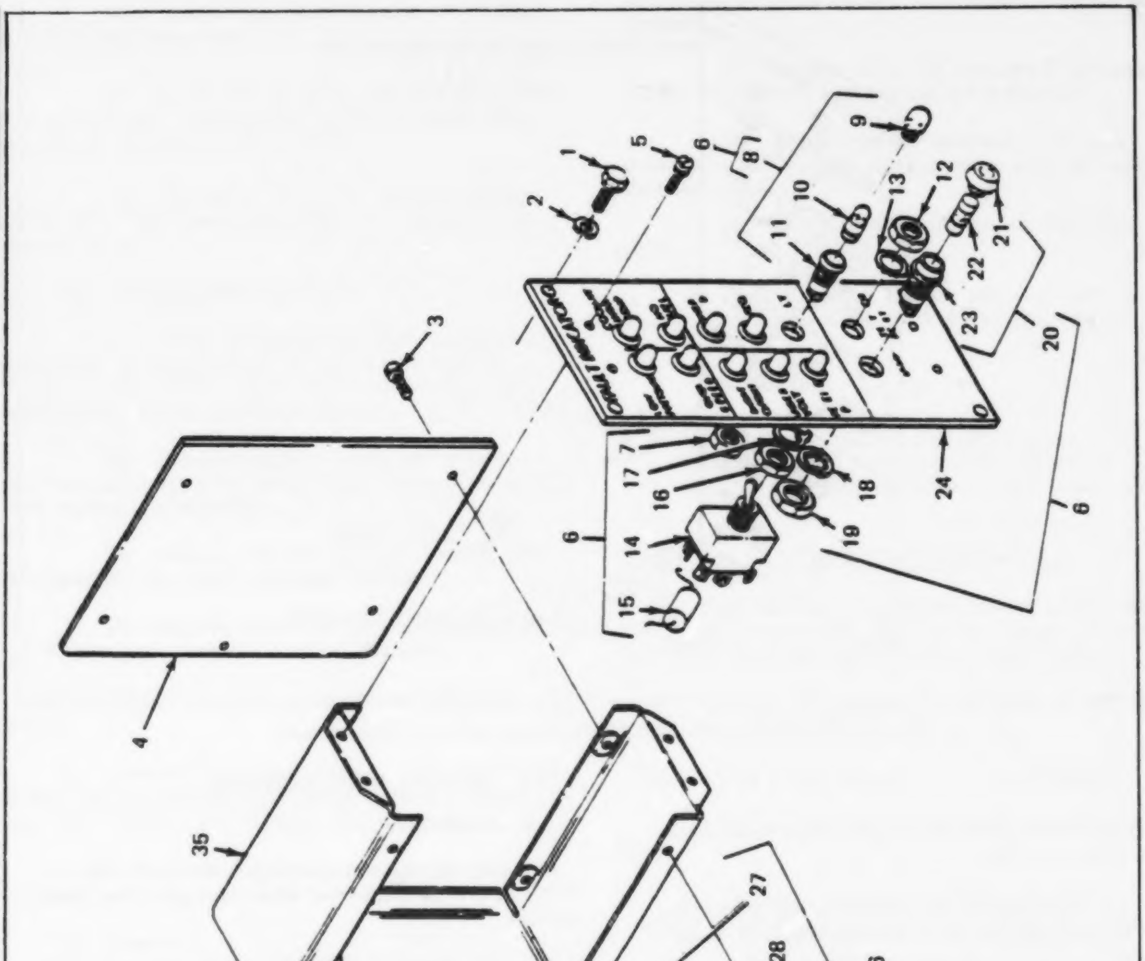
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Figure 39A Fault Locating Indicator, Exploded View (Sheet 1 of 2)

1. Screw and assembled washer
2. Lockwasher
3. Screw and captive washer assy
4. Cover plate
5. Screw and captive washer assy
6. Indicator panel assembly
7. Nut
8. Indicator light assembly
9. Lens
10. Lamp
11. Base
12. Nut
13. Tooth lockwasher
14. Test or reset switch
15. Capacitor
16. Nut
17. Positioning washer
18. Nut
19. Tooth lockwasher
20. Fuse holder asembly
21. Cap
22. Fuse
23. Fuse holder
24. Panel
25. Screw and captive washer assy
26. Cover plate assy
27. Screw and captive washer assy
28. Screw
29. Lockwasher
30. Relay
31. Component board assembly
32. Cover plate
33. Screw and captive washer assy
34. Wiring harness
35. Housing

Figure 39A Fault Locating Indicator, Exploded View (Sheet 2 of 2)

(3) Refer to paragraph 2-10 and start the generator set.

(4) Use the manual speed control to set generator output frequency.

(5) Rotate the control knob 90 degrees. Frequency change shall not exceed 1 percent for a 90 degree rotation (0.6 Hz for 50/60 Hz generator sets and 4 Hz for 400 Hz generator sets).

(6) Replace manual speed control if it fails any of the above tests or inspections.

c. Replacement.

(1) Removal.

(a) Loosen adjustment screw (figure 3-40) and remove cable from sleeve.

(b) Remove nut and lockwasher, screw, and clip.

(c) Remove nut and washer to remove manual speed control cable assembly and grommet.

(d) Do not remove screws, lockwashers, and mounting bracket unless inspection revealed damaged.

NOTE

See paragraph 3-59 for emergency conversion from tactical precise to tactical utility and for reconfiguration back to tactical precise.

(2) Cleaning.

(a) Clean all metal manual speed control parts in an approved solvent and dry thoroughly.

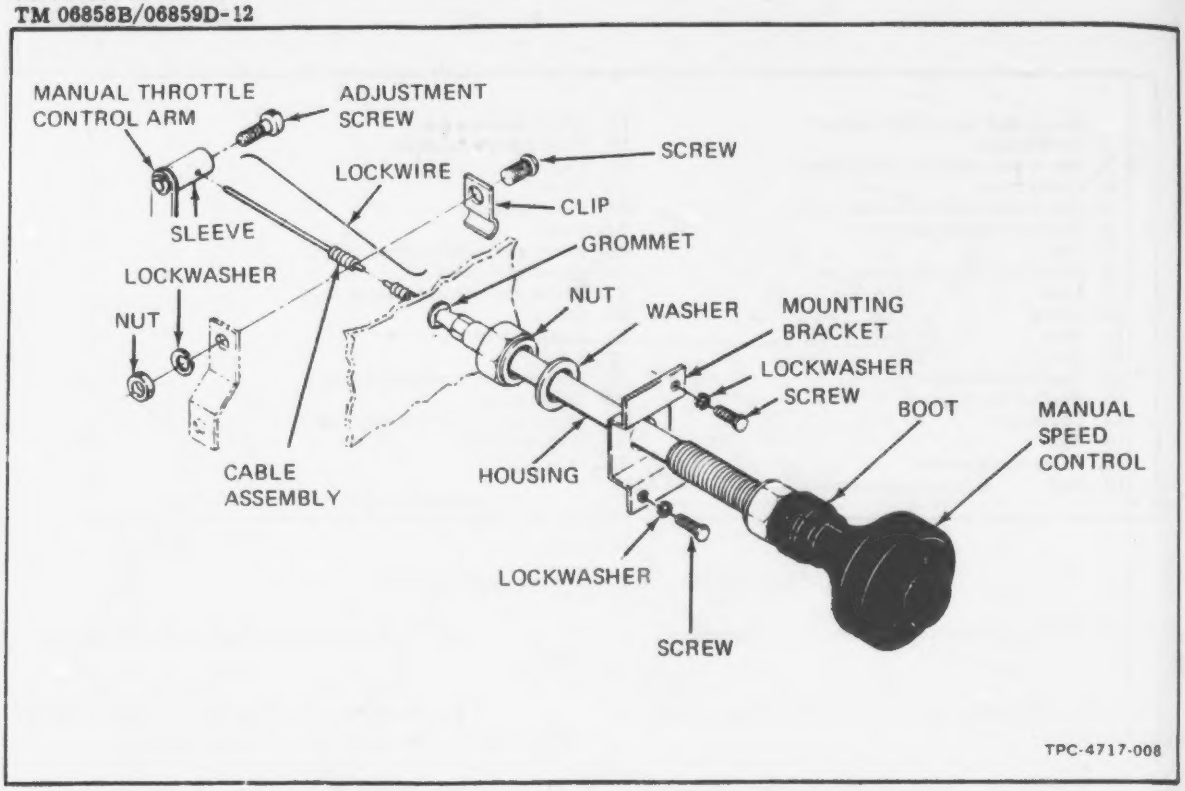

MANUAL THROTTLE CONTROL ARM
ADJUSTMENT SCREW
SCREW
LOCKWIRE
CLIP
SLEEVE
GROMMET
LOCKWASHER
NUT
NUT
WASHER
MOUNTING BRACKET
LOCKWASHER
SCREW
BOOT
MANUAL SPEED CONTROL
CABLE ASSEMBLY
HOUSING
LOCKWASHER
SCREW
TPC-4717-008

Figure 3-40. Manual Speed Control, Exploded View

(b) Clean boot on manual speed control knob with soap and water.

(3) Installation. Install manual speed control in reverse order of removal procedures.

3-115. DC CONTROL CIRCUIT BREAKER.

a. Removal.

(1) Tag and disconnect electrical leads to DC circuit breaker (figure 3-41).

(2) Remove mounting nut and tooth lockwasher to remove circuit breaker.

b. Cleaning and Inspection.

(1) Clean DC circuit breaker with filtered compressed air and a soft bristle brush or wipe with a clean, lint-free cloth lightly moistened with an approved solvent.

(2) Visually inspect circuit breaker for cracks, corrosion, stripped or damaged threads and evidence of shorting or other damage.

c. Testing.

(1) Using an ohmmeter, check for open circuit across circuit breaker terminals.

(2) Depress circuit breaker button and check ohmmeter indication. Ohmmeter shall indicate continuity.

(3) Replace circuit breaker if above test requirements are not met.

d. Installation. Install DC circuit breaker in reverse order of removal procedures.

3-116. LOAD MEASURING UNIT.

a. Removal.

(1) Tag and disconnect electrical connector from load measuring unit (figure 3-42).

(2) Remove screws and tooth lockwashers to remove load measuring unit.

b. Cleaning and Inspection.

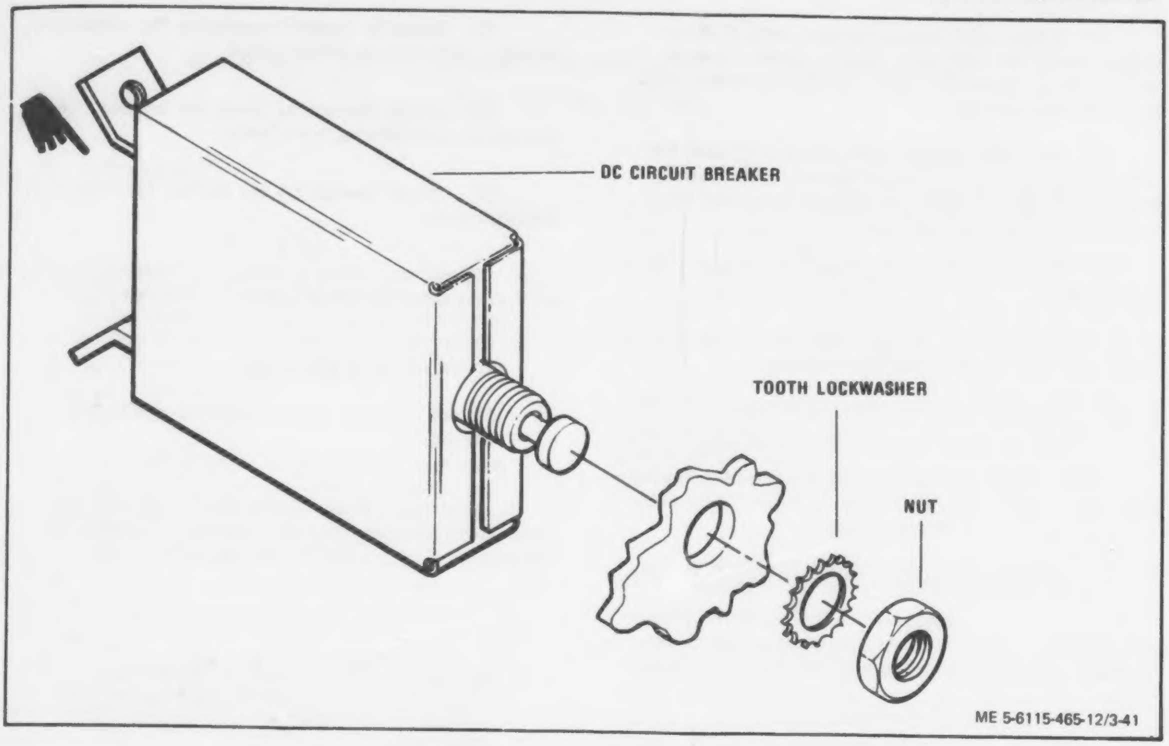

DC CIRCUIT BREAKER
TOOTH LOCKWASHER
NUT
ME 5-6115-465-12/3-41

Figure 3-41. DC Circuit Breaker, Removal and Installation

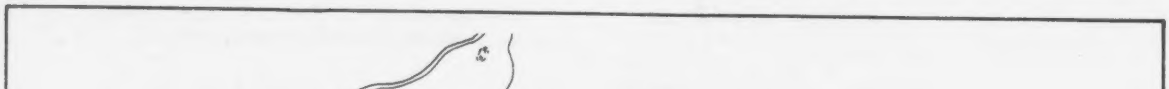

LOAD MEASURING UNIT
ELECTRICAL CONNECTOR
SCREW & CAPTIVE WASHER

Figure 3-42. Load Measuring Unit, Removal and Installation

ME 5-6115-465-12/3-42

(1) Clean load measuring unit with filtered compressed air and a soft bristle brush or wipe with a clean, lint-free cloth lightly moistened with an approved solvent.

(2) Visually inspect load measuring unit for cracks, dents, corrosion, stripped or damaged threads, bent or broken connector pins, and evidence of shorting or other damage.

(3) Replace load measuring unit if damaged or inoperable.

c. Installation. Install load measuring unit in reverse order of removal procedures.

3-117. GOVERNOR CONTROL UNIT (Precise Sets Only).

Inspect governor control unit for cracks, dents, insecure connectors, insecure mounting, and evidence of shorting or other damage.

3-118. INTERCONNECTING WIRING HARNSSES.

a. Removal. Remove wiring harness terminals, wires, and connectors as required for access to other components and to replace damaged parts.

b. Cleaning and Inspection.

(1) Clean wiring harness with filtered compressed air and an electrician's brush or wipe with a clean, lint-free cloth lightly moistened with an approved solvent.

(2) Visually inspect connector for corrosion, cracks, and bent or broken pins.

(3) Check electrical leads for burned, bent, corroded, or missing terminals.

(4) Check insulation for burns, shafing, and deterioration.

c. Testing. Test continuity of individual wires with a multimeter using figures FO-1 and FO-2.

CAUTION

Do not use acid core solder on electrical wiring.

d. Repair. Replace wires, terminals, and connectors by unsoldering connections, installing replacement parts and soldering connections.

NOTE

If more than 30 percent of the wires are damaged, replace the wiring harness and forward it to higher level maintenance for rebuilding.

e. Installation. Install wiring harness in reverse order of removal procedures.

Section XVI. ORGANIZATIONAL MAINTENANCE OF THE GENERATOR ELECTRICAL SYSTEM

3-119. GENERAL.

WARNING

The generator set shall be shut down prior to performing maintenance on the generator electrical system. Serious injury or death by electrocution may result from failure to observe this warning.

a. One lead of each of the two coils of each generator phase (30 KW, 50/60 Hz Precise and Utility Sets) is connected directly to the voltage reconnection board. The remaining two leads of each phase pass through the windows of a three-window current transformer which serves as a current pickup for generator exciter voltage regulation. A second three-window current transformer serves as a sensor for control cubicle instruments. The leads make two passes through the windows of this transformer. Two leads of one of the phases then make one pass through a single-window cross-current transformer which senses current for reactive power measurement. Local voltage sensing and adjustment are accomplished across a single coil of the remaining phase. (See FO-1.)

NOTE

On 30 KW, 400 Hz Precise Sets, two leads of one of the phases, instead of being connected directly to the voltage reconnection board, are routed to pass through the window of the cross-current transformer.

b. The voltage reconnection board consists of a stationary terminal board and a movable link-type board. This arrangement provides a means of connecting the two coils of each phase in series or parallel to provide 120/208 or 240/416 Vac generator output. Simultaneously, the voltage reconnection board provides reconnection of any other circuits necessary to convert the generator set from 120/208 Vac to 240/416 Vac operation.

c. The reconnection board is connected to the load terminal board through a three pole, three phase main load contactor which is electrically controlled by the circuit breaker switch on the control cubicle panel. The main load contactor will open automatically when any of the protective devices actuates or when the START-RUN-STOP switch on the control cubicle panel is placed in the STOP position.

d. The generator electrical system also contains a 125 V, 15 amp duplex convenience receptacle which is equipped with a spring-loaded protective cover and protected by a 15-amp circuit breaker.

e. Generator output voltage is controlled by a solid state type regulator which is adjusted by the voltage adjust rheostat on the control cubicle panel. Voltage sensing may be local (at the generator set) or from a remote location. The voltage regulator permits parallel operation of generator sets by cross connection through the paralleling receptacles on the precise generator sets. Utility sets are not interconnected but the dummy plugs must be installed.

NOTE

If operating on 240/416 V and remote sensing is required, a 2:1 transformer must be supplied.

f. The tactical relay box, which is common to all three models, contains relays to shut down the generator set upon actuation of the over voltage, short circuit, overloaded, and reverse power protective devices. It also houses the current transformer load resistors.

g. The special relay box, which is found on all three models of the generator sets, contains the remainder of the protective devices and the voltage regulator paralleling controls.

h. The precise relay box, which is found only on precise models of the generator set, contains the paralleling controls for the electric governor and the fixed resistors of the frequency adjustment system. The precise relay box of the 50/60 Hz precise model is equipped with a frequency selector switch.

3-120. VOLTAGE RECONNECTION BOARD.

a. Removal.

(1) Remove screws and lockwashers to remove voltage reconnection board and spacers.

(2) Tag and disconnect electrical leads to voltage reconnection board assembly (figure 3-43).

b. Cleaning and Inspection.

(1) Clean reconnection board assembly with filtered compressed air and a soft bristle brush or wipe with a clean, lint-free cloth lightly moistened with an approved solvent.

(2) Visually inspect terminal board for burned or corroded terminals and links, cracked or broken insulation, links and terminals, and stripped or otherwise damaged threads.

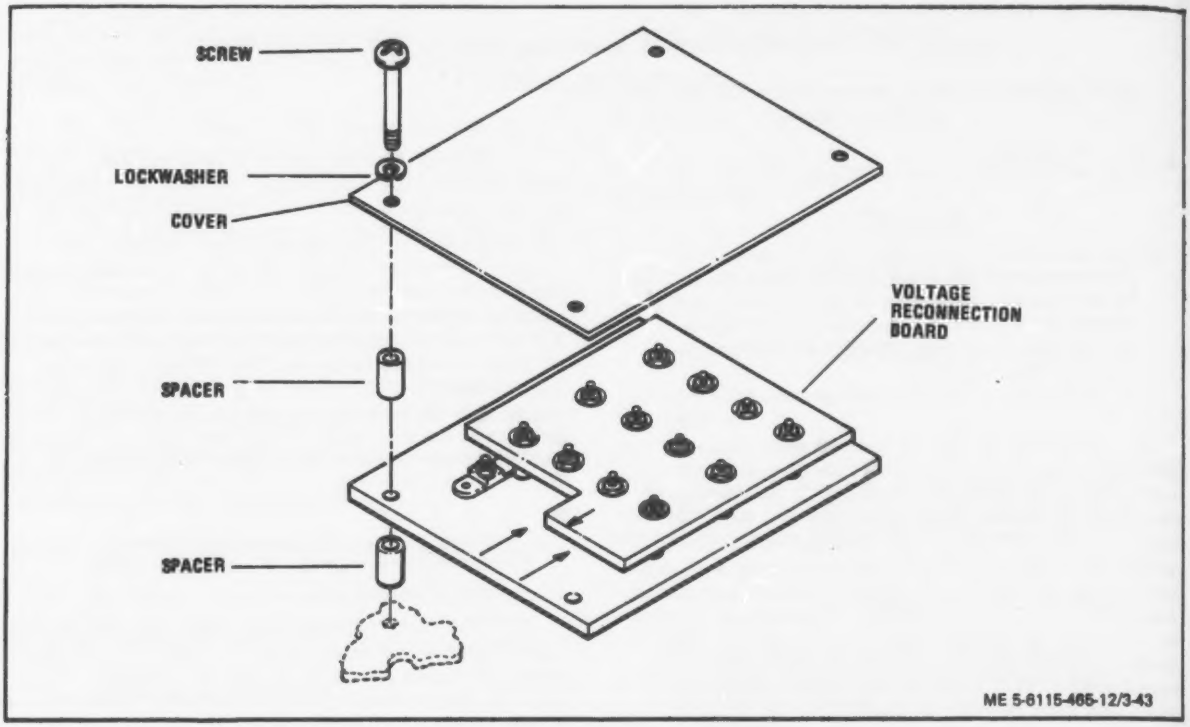


Figure 3-43. Voltage Reconnection Board, Removal and Installation

c. **Testing.** Test continuity of reconnection board links with a multimeter or similar device.

d. **Installation.** Install terminal board assembly in reverse order of removal procedures.

3-121. MAIN LOAD CONTACTOR.

a. **Inspection.** Visually inspect main load contactor (figure 1-2) for insecure mounting, loose electrical connections, cracks, corrosion, and evidence of shorting or other damage.

b. **Testing.**

(1) Using a multimeter or a continuity light, check for open circuit across terminal studs A1 and A2, B1 and B2, and C1 and C2 (figures FO-1 and FO-2).

(2) Check for open circuit across connector pins C and D, E and F, G and H, J and K, and R and T.

(3) Check for continuity between connector pins A and B, L and M, N and P, and R and S.

(4) Apply 24 Vdc across connector pins A and B while listening for audible indication of actuation.

(5) With the actuator coil energized, check for continuity between connector pins C and D, E and F, G and H, J and K, and R and T.

(6) Check for open circuit across connector pins L and M, N and P, and R and S.

(7) Check for continuity across terminal studs A1 and A2, B1 and B2, and C1 and C2.

(8) Disconnect 24 Vdc source from connector pins A and B.

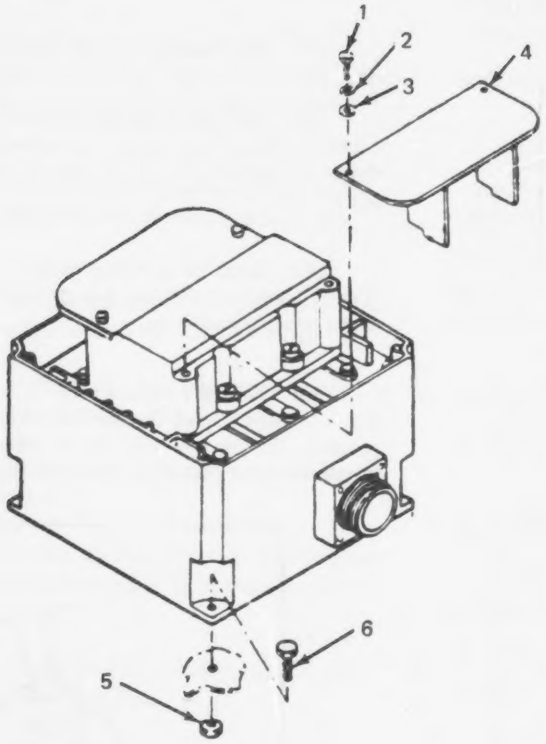
c. Removal.

(1) Remove screws (1, figure 3-43A), lockwashers (2), and flat washers (3) to remove terminal covers (4).

(2) Tag and disconnect electrical leads to terminals.

(3) Disconnect wiring harness connector from main load contactor connector.

d. Installation. Install main load contactor in reverse order of removal procedures.



1. Screw
2. Lockwasher
3. Flat washer
4. Terminal cover
5. Nuts
6. Screws

Figure 3-43A. Main Load Contactor Removal

3-122. CURRENT TRANSFORMER ASSEMBLIES.

Inspect current transformer assemblies (figure 1-1) for cracks, breaks, corrosion, insecure mounting, loose electrical connections, and evidence of shorting or other damage.

3-123. LOAD TERMINAL BOARD ASSEMBLY.

a. Visually inspect load terminal board assembly (figure 1-2) for cracks, breaks, corrosion, burns, insecure mounting, loose electrical connections and other damage.

b. Replace lost or broken terminal clip (Retainer, Safety Clip). The terminal clip is a component of both the load terminal and the ground terminal. If the terminal clip is lost or broken, fabricate as follows.

(1) Requisition bulk wire NSN 9505-00-804-3814 (0.042 inch diameter) for the ground terminal (ground stud). Requisition bulk wire NSN 9505-01-049-0144 (0.050 inch diameter) for the load terminal.

(2) Cut of about 3 inches of the wire; short enough to keep the clips from touching another terminal or the generator frame in the open or closed position.

(3) Slip the wire through the hole in the terminal.

(4) Hold the terminal as shown (Detail A, figure 3-43B) and bend both ends of the wire straight up keeping the wire in as straight a line as you can with the terminal body.

(5) Bend the wire into back-to-back 90° angles (Detail B, figure 3-43B) so that the legs of both angles are about one-half inch long.

(6) Bend the ends of each 90° angle down around into a U-shape (Detail C, figure 3-43B) so that if done properly, the clip will hold the nut when it is unscrewed to install the cable (Detail D, figure 3-43B).

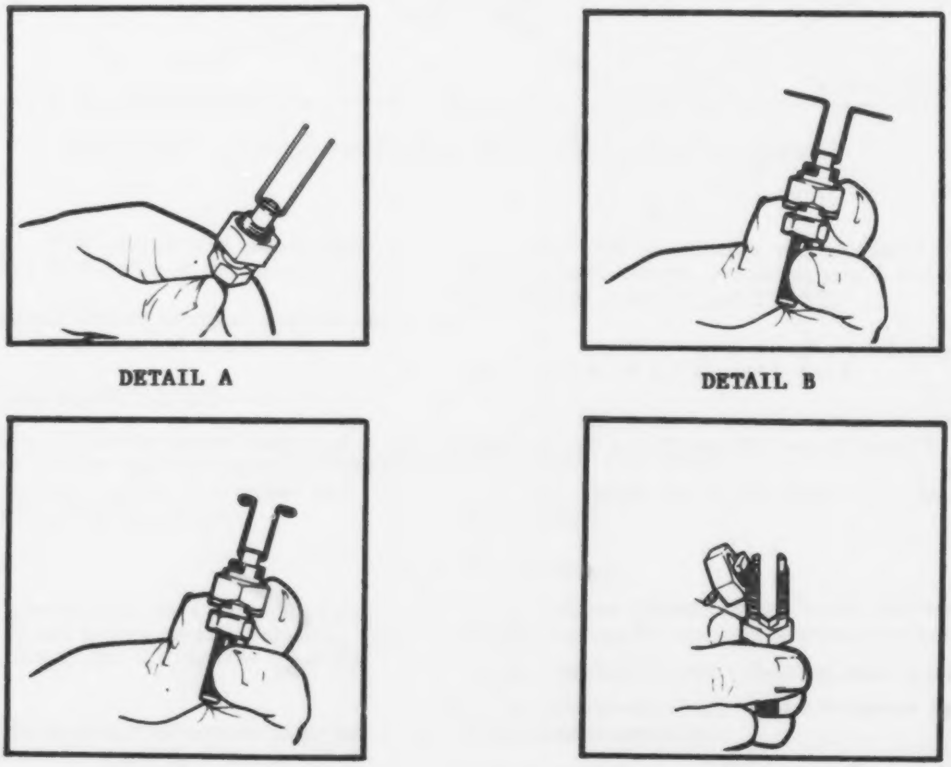

DETAIL A
DETAIL B
DETAIL C
DETAIL D

Figure 3-43B. Terminal Clip Replacement

3-124. CONVENIENCE RECEPTACLE AND CIRCUIT BREAKER.

a. Removal.

(1) Remove screws (1, figure 3-44) and carefully pull convenience receptacle box out from generator set.

(2) Remove screws (2) and carefully pull convenience receptacle and circuit breaker away from box (17).

(3) Tag and disconnect electrical leads from convenience receptacle and circuit breaker.

(4) Remove nuts (3) and screws (4 and 5) to remove cover (6) and gasket (7).

(5) Remove nuts (8) and screws (9) to remove receptacle (10).

(6) Remove nut (11) and tooth lockwasher (12) to remove circuit breaker (13) from bracket (14).

(7) Remove screw (16) to disconnect wire (15) from circuit breaker (13).

b. Cleaning and inspection.

(1) Clean convenience receptacle with filtered compressed air and a soft bristle brush or wipe with a clean, lint-free cloth lightly moistened with an approved solvent.

(2) Visually inspect convenience receptacle for cracks, breaks, corrosion, bent terminals, burns or other indications of damage.

(3) Inspect cover for cracks, corrosion, damaged spring, and damaged or deteriorated gasket.

(4) Inspect circuit breaker for cracks, corrosion, and other damage.

(5) Using an ohmmeter or similar device, test circuit breaker as follows:

(a) Pull out circuit breaker button and check for open circuit across terminals. Ohmmeter shall indicate open circuit.

(b) Depress circuit breaker button and check for continuity across terminals. Ohmmeter shall indicate continuity.

(6) Check all threads for crossing, stripping and other damage

(7) Replace any defective parts.

c. Installation. Install convenience receptacle and circuit breaker in reverse order of removal instructions.

3-125. PARALLELING RECEPTACLES.

a. Removal.

(1) Remove screws and lockwashers (figure 3-45).

(2) Unscrew protective caps and shorting plug from paralleling receptacles.

(3) Remove screws and pull paralleling receptacles away from generator set.

(4) Tag and unsolder electrical leads to receptacles.

b. Cleaning and Inspection.

(1) Clean paralleling receptacles with filtered compressed air and an electrician's brush or wipe with a clean, lint-free cloth lightly moistened with an approved solvent.

(2) Visually inspect paralleling receptacles for cracks, corrosion, stripped or otherwise damaged threads and evidence of shorting or other damage.

(3) Visually inspect covers and shorting plug for cracks, corrosion, broken chains, stripped or otherwise damaged threads, and damaged or deteriorated gasket.

CAUTION

Do not use acid core solder on electrical components.

c. Installation. Install paralleling receptacles in reverse order of removal procedures, soldering electrical connections. Use figures FO-1 and FO-2 as a guide for proper connection.

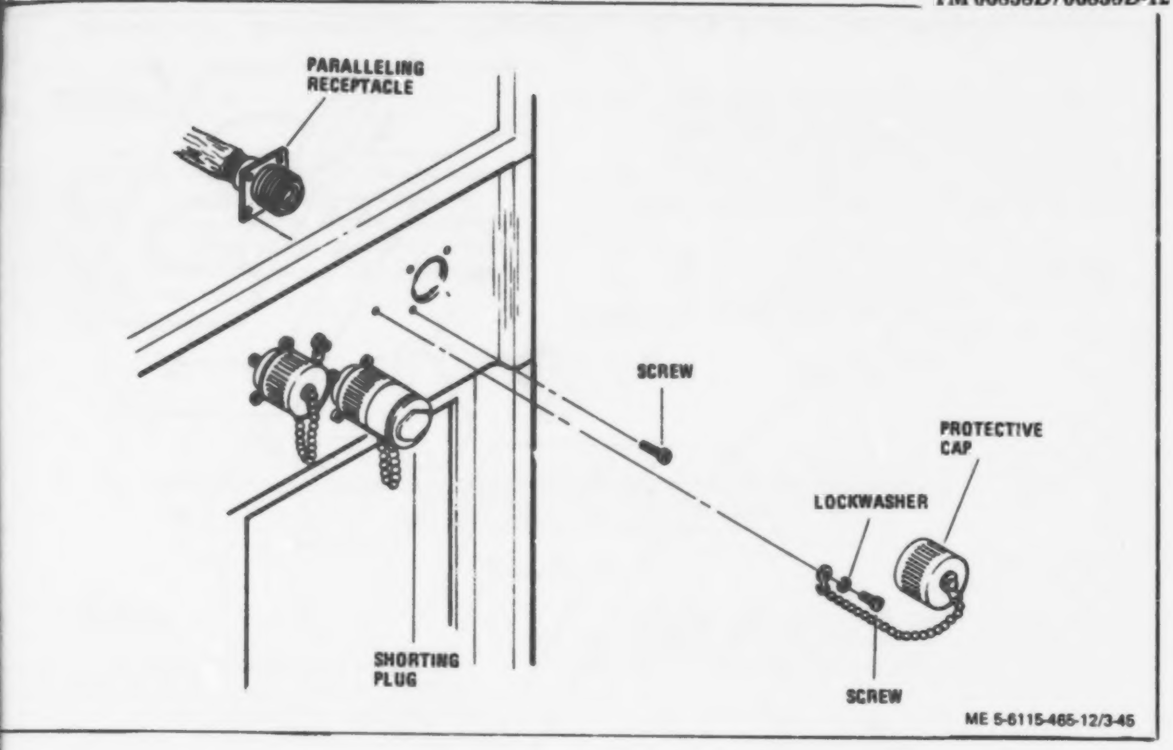


Figure 3-45. Paralleling Receptacles, Removing and Installation

26. TACTICAL RELAY ASSEMBLY.

Visually inspect tactical relay assembly (figure
) for insecure mounting, cracks, dents, corro-
n, bent or broken connector pins and evidence
horting or other damage.

27. PRECISE RELAY ASSEMBLY (50/60 Hz Precise Sets).

Visually inspect precise relay assembly (figure
) for insecure mounting, cracks, dents, corro-
n, bent or broken connector pins and evidence
horting or other damage.

28. SPECIAL RELAY ASSEMBLY (50/60 Hz Precise and Utility Sets).

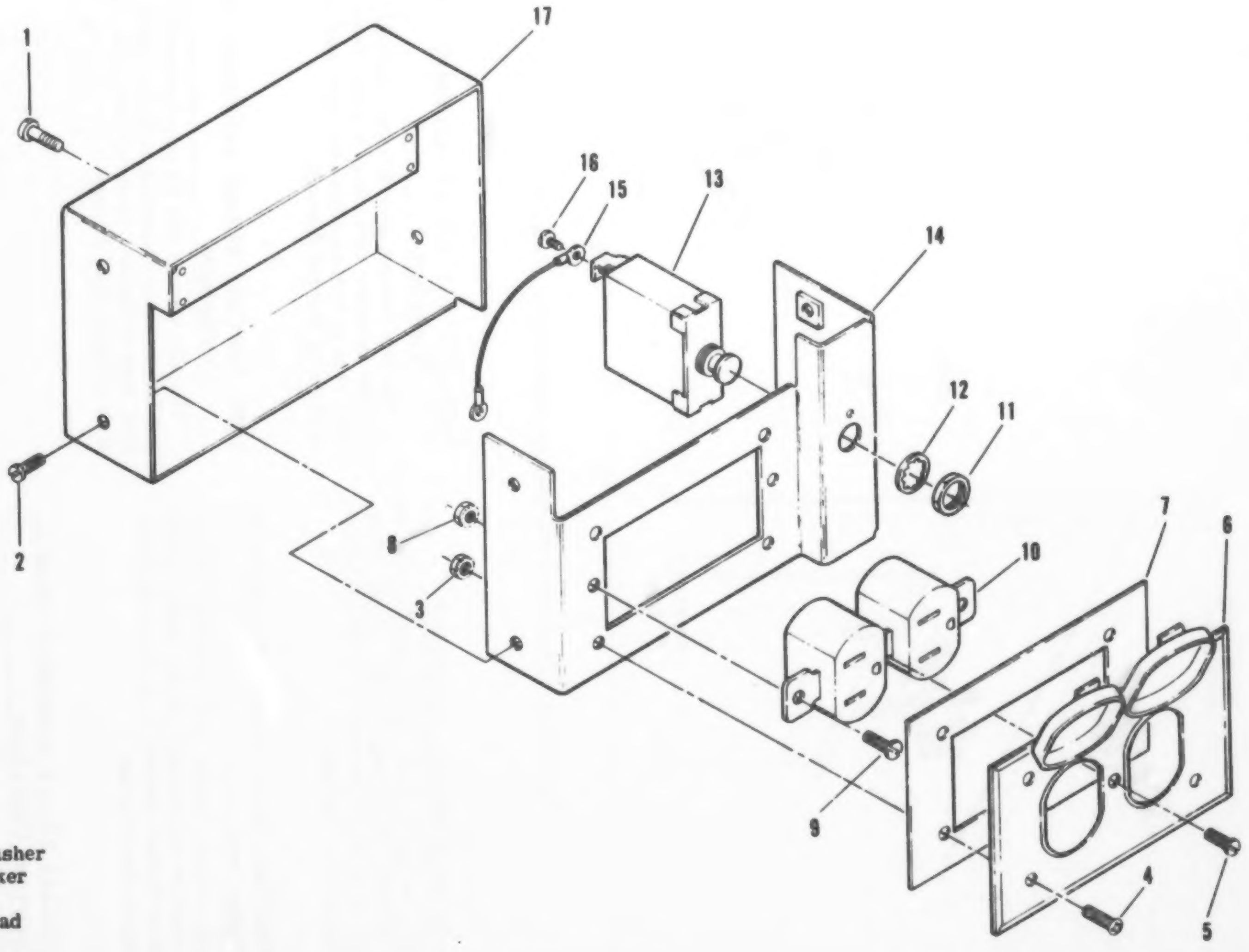
Visually inspect special relay assembly (figure
) for insecure mounting, cracks, dents, corro-
n, bent or broken connector pins, and evidence
horting or other damage.

3-129. SPECIAL RELAY ASSEMBLY (400 Hz Precise Sets).

Visually inspect special relay assembly (figure 1-1) for insecure mounting, cracks, dents, corrosion, bent or broken connector pins, and evidence of shorting or other damage.

3-130. PRECISE RELAY ASSEMBLY (400 Hz Precise Sets).

Visually inspect 400 Hz relay assembly (figure 1-1) for insecure mounting, cracks, dents, corrosion, bent or broken connector pins, and evidence of shorting or other damage.



1. Screw
2. Screw
3. Nut
4. Screw
5. Screw
6. Cover
7. Gasket
8. Nut
9. Screw
10. Receptacle
11. Nut
12. Tooth lockwasher
13. Circuit breaker
14. Bracket
15. Electrical lead
16. Screw
17. Receptacle box

and Circuit Breaker, Removal and Installation

Section XVII. ORGANIZATIONAL MAINTENANCE OF THE GENERATOR ASSEMBLY

3-131. GENERAL.

Electrical power is generated by a single bearing, synchronous, brushless, self-ventilated generator assembly with an integral exciter assembly. Organizational maintenance of the generator assembly is limited to visual inspection of the generator and the generator bearing.

3-132. ORGANIZATIONAL MAINTENANCE INSPECTION OF GENERATOR ASSEMBLY.

a. Visually inspect generator assembly for insecure mounting, cracks, corrosion, accumulations of foreign material in ventilator screens and other damage.

b. Listen for unusual noises while operating.

c. Notify higher level maintenance of any discrepencies found during inspection.

Section XVIII. ORGANIZATIONAL MAINTENANCE OF THE HOUSING AND SKID BASE ASSEMBLIES

3-133. GENERAL.

The housing assembly fully encloses the top, sides and ends of the generator set. It consists of doors, covers, and panels. The cooling air intake openings which provide access to internal components are covered by doors which are equipped with seals to prevent the entry of foreign materials when the doors are closed. The cooling air exhaust opening is covered by the shutter and grille assemblies (paragraphs 3-86 and 3-87). The plate and sleeve assembly allows connection of load lines while excluding foreign materials. The lifting frame, located in the center of the housing assembly, is equipped with lifting clevises at the top of each side to which a hoisting sling may be attached. The housing assembly is supported on the skid base assembly which also provides support for the engine and generator assemblies. The skid base also provides the generator set grounding point and is drilled to accept attachment of the wheel mounting kit and M-200 trailer. A metal sheet near the bottom of the skid base prevents the entry of debris. Drain holes prevent the accumulation of spilled liquids on the sheet.

3-134. DOORS, COVERS, AND PANELS.

a. Removal.

(1) Remove grille, radiator and shutter assembly (paragraphs 3-86 through 3-89).

(2) Remove convenience receptacle and circuit breaker (paragraph 3-124).

(3) Remove paralleling receptacles (paragraph 3-125).

(4) Remove doors, covers and panels by following the ascending numerical sequence of index numbers (1 through 105) assigned to figure 3-46.

NOTE

It is not necessary to completely disassemble the housing assembly. Only those parts requiring replacement need be removed.

NOTE

A wiring harness support clamp on the underside of the top rear cover (87, figure 3-46) must be removed before attempting to remove the cover.

b. Installation. Install housing assembly doors, covers, and panels in reverse order of removal procedures.

3-135. PLATE AND SLEEVE ASSEMBLY.

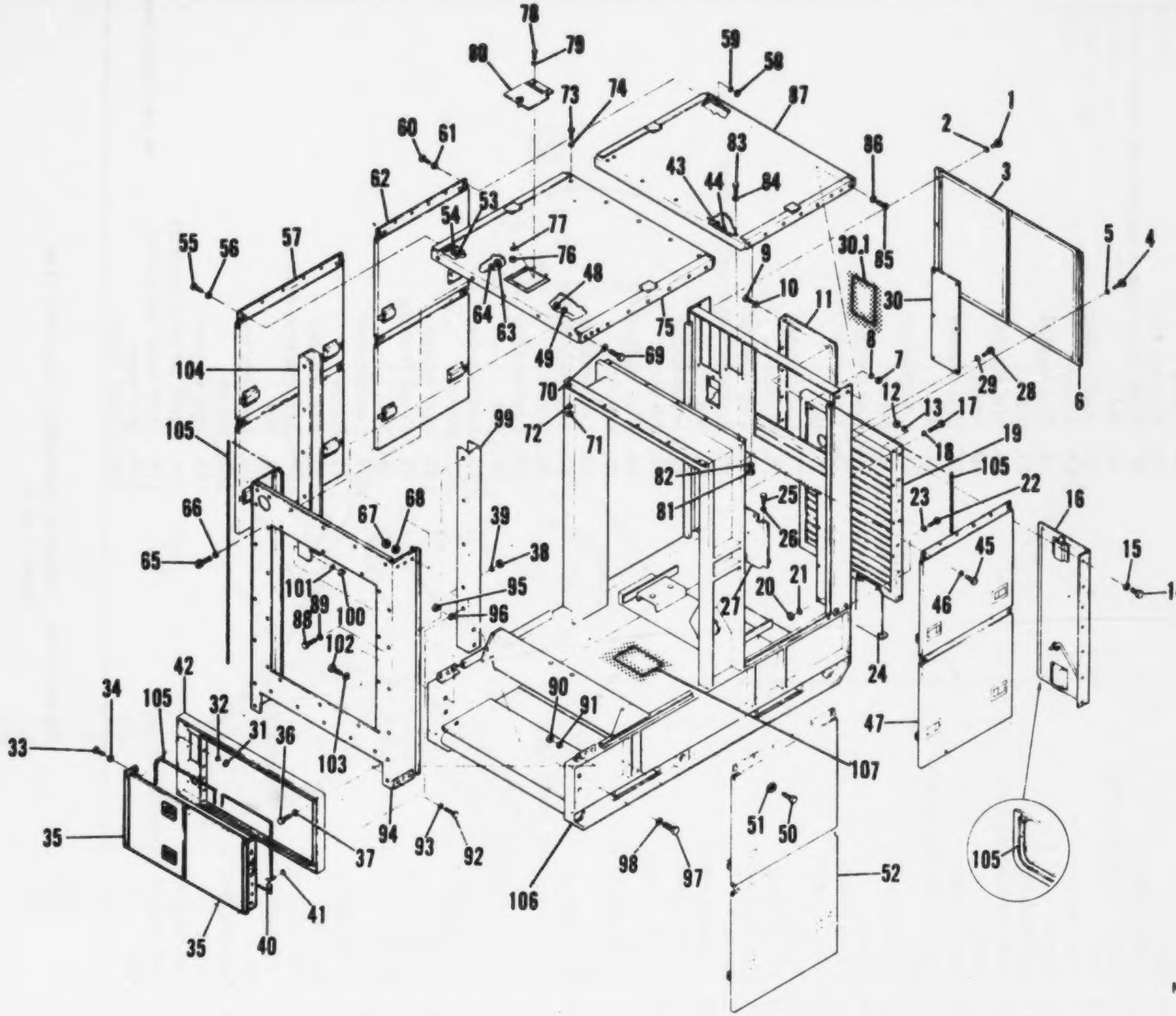
a. Removal and Disassembly.

(1) Remove screws (1, figure 3-47) and lockwashers (2) to remove plate and sleeve assembly.

(2) Remove ring (3) and bushing (4); then remove nuts (5), screws (6) and retainer (7) to remove sleeve (8) with draw string (9) from plate (10).

b. Cleaning and Inspection.

(1) Clean plate and sleeve assembly with a clean, lint-free cloth lightly moistened with an approved solvent.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ME 5-6115-465-12/3-46 (1)

Figure 3-46. Housing Assembly, Exploded View (Sheet 1 of 2)

best copy available

1. Screw
2. Lockwasher
3. Right control cubicle door
4. Screw
5. Lockwasher
6. Left control cubicle door
7. Nut
8. Flat washer
9. Screw
10. Lockwasher
11. Right ventilation door
12. Nut
13. Flat washer
14. Screw
15. Lockwasher
16. Left ventilation door
17. Screw
18. Lockwasher
19. Ventilation louver panel
20. Nut
21. Flat washer
22. Screw
23. Lockwasher
24. Cover panel
25. Screw
26. Lockwasher
27. Cover panel
28. Screw
29. Lockwasher
30. Cover panel
30.1 Cover Plate
31. Nut
32. Lockwasher
33. Screw
34. Flat washer
35. Battery compartment door
36. Screw
37. Lockwasher
38. Nut
39. Lockwasher
40. Screw
41. Flat washer
42. Battery door frame
43. Nut
44. Lockwasher
45. Screw
46. Flat washer
47. Left generator compartment door
48. Nut
49. Lockwasher
50. Screw
51. Flat washer
52. Left engine compartment door
53. Nut
54. Lockwasher
55. Screw
56. Flat washer
57. Right engine compartment door
58. Nut
59. Lockwasher
60. Screw
61. Flat washer
62. Right generator compartment door
63. Nut
64. Lockwasher
65. Screw
66. Flat washer
67. Nut
68. Lockwasher
69. Screw
70. Flat washer
71. Nut
72. Lockwasher
73. Screw
74. Flat washer
75. Top front cove
76. Nut
77 Lockwasher
78. Screw
79. Flat washer
80. Radiator filler access door
81. Nut
82. Lockwasher
83. Screw
84. Flat washer
85. Screw
86. Lockwasher
87. Top rear cover
88. Screw
89. Lockwasher
90. Nut
91. Lockwasher
92. Screw
93. Flat washer
94. Front housing
95. Nut
96. Lockwasher
97. Screw
98. Flat washer
99. Left housing support
100. Nut
101. Lockwasher
102. Screw
103. Flat washer
104. Right housing support
105. Door seal (all doors)
106. Skid base
107. Cover Plate

ME 5-6115-465-12/3-46 (2)

Figure 3-46. Housing Assembly, Exploded View
(Sheet 2 of 2)

1. Screw
2. Lockwasher
3. Ring
4. Bushing
5. Nut
6. Screw
7. Retainer
8. Sleeve
9. Draw string
10. Plate

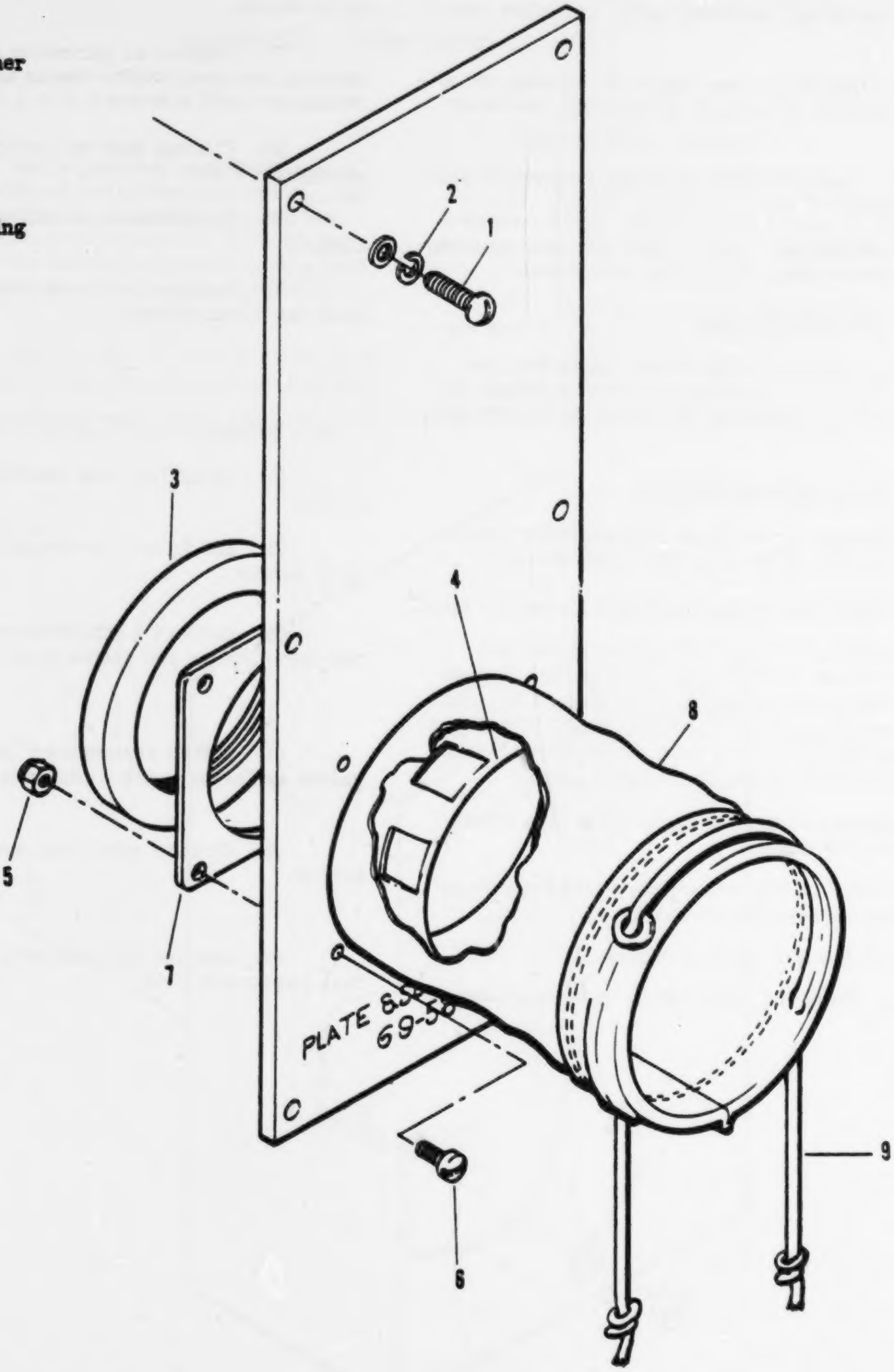

Figure 3-47. Plate and Sleeve Assembly, Exploded View

(2) Visually inspect plate for cracks, dents, illegible markings, defective paint, and other damage.

(3) Inspect weather sleeve for cracks, deterioration, broken or missing draw string, and other damage.

(4) Check threaded parts for stripped or damaged threads.

c. Installation. Install plate and sleeve assembly in reverse order of removal procedures.

3-136. LIFTING FRAME.

Visually inspect lifting frame (figure 1-1) for cracks, corrosion, damaged or missing lifting clevis, insecure mounting hardware, and other damage.

3-137. SKID BASE ASSEMBLY.

a. Visually inspect skid base assembly (figure 1-1) for cracks, corrosion, and other damage.

b. Check that bottom sheet drain holes are open.

c. Inspect ground stud for stripped or otherwise damaged threads, corrosion, and other damage. Replace lost or broken terminal clip (Retainer, Safety Clip). For fabrication procedure, see Chapter 3, Section XVI Organizational Maintenance of the Generator Electrical System, paragraph 3-123 Load Terminal Board Assembly.

d. Inspect fuel tank for insecure mounting, cracks, leaks, and other damage.

e. Check that fuel tank and engine crankcase drains are securely installed and not leaking.

f. Test fuel level sensor as follows:

(1) Drain fuel tank assembly (paragraph 3-49).

(2) Disconnect electrical connector from fuel level sensor.

(3) Connect an ohmmeter or similar device between fuel level sensor casing and connector pin. Ohmmeter shall indicate 0.0 to 1.0 ohms resistance.

(4) Fill fuel tank with proper grade of fuel (paragraph 3-49).

(5) Ohmmeter shall indicate 27 ± 2 ohms resistance.

(6) Replace fuel level sensor if it fails to meet test requirements.

g. Replace fuel level sensor as follows:

(1) Drain fuel tank assembly (paragraph 3-49).

(2) Disconnect electrical connector from fuel level sensor.

(3) Remove 5 attaching screws to remove fuel level sensor and gasket from fuel tank.

(4) Install replacement fuel level sensor and gasket and secure with 5 attaching screws.

(5) Connect electrical connector to fuel level sensor.

(6) Service fuel tank with proper grade of fuel (paragraph 3-49).

Section XIX. TOOL STOWAGE BOX

3-138. GENERAL.

A tool stowage box is provided on the left side of the generator set (figure 1-2). The generator access door must be opened to gain access to the tool box. The dimensions of the tool box are 15.25" x 10.43" x 6.12". The tool box has a hinged cover that is held in the closed position by a single draw-pull fastener.

a. Removal.

(1) Remove the hex nuts (1, figure 3-48), lockwashers (2) and capscrews (3) to remove the tool box.

b. Inspection and Cleaning.

(1) Inspect the tool box for damaged hinge or fastener, dents, corrosion, and deterioration of finish.

(2) Clean the tool box with an approved solvent and dry thoroughly.

c. Installation. Install the tool box by reversing removal procedures.

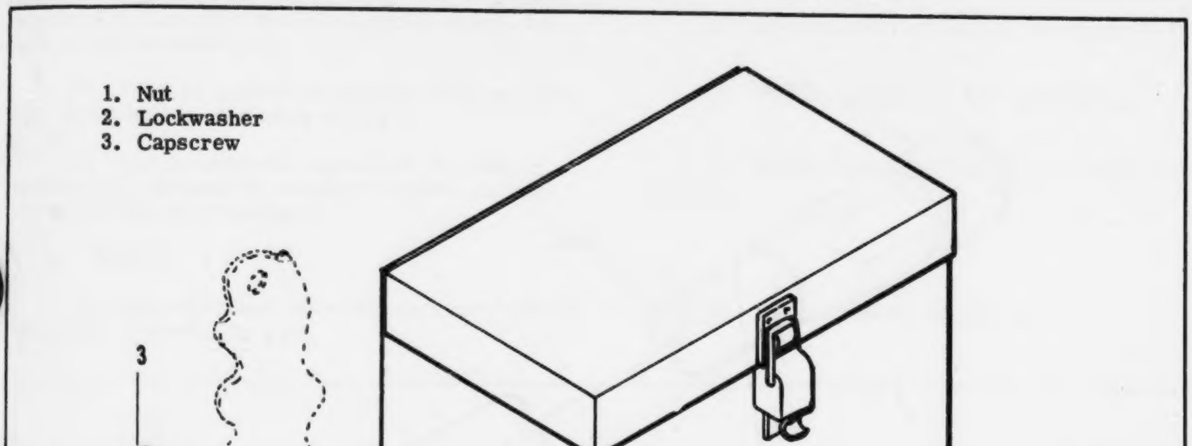

Figure 3-48. Tool Stowage Box

ME 5-6115-465-12/3-48

Section XX. AUXILIARY FUEL LINE

3-139. GENERAL.

The auxiliary fuel line is a 25 foot, flexible, heat and oil resistant hose. It is used to connect the generator set to an auxiliary fuel supply. By connecting the auxiliary fuel line to the auxiliary fuel supply, the generator set may serve as a fuel source.

3-140. REPAIR OF AUXILIARY FUEL LINE.

a. Remove adapter, captive chain and fittings from hose (figure 3-49).

b. Clean all parts in an approved solvent and dry thoroughly.

c. Visually inspect hose for cuts, deterioration, and other damage.

d. Check all threaded parts for stripped or otherwise damaged threads.

e. Replace any parts found damaged.

f. Reinstall adapter, captive chain and fittings.

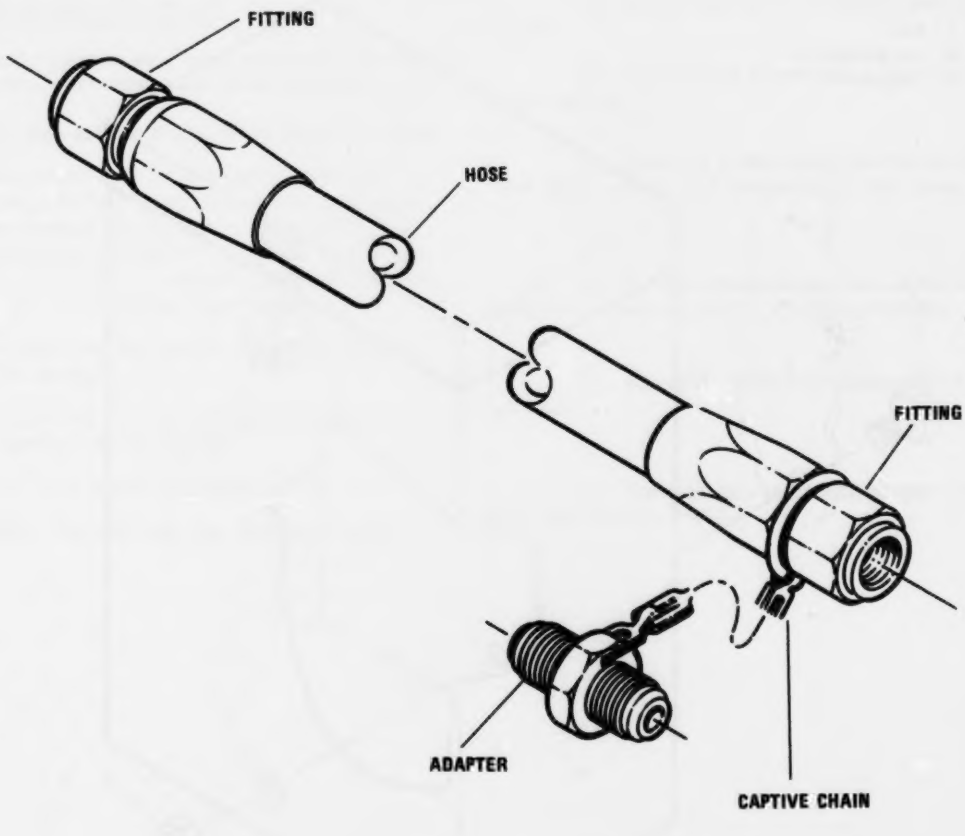

Figure 3-49. Repair of Auxiliary Fuel Line

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Section XXI. PARALLELING CABLE

3-141. GENERAL.

The paralleling cable is a 25 foot, four conductor, flexible, heat and oil resistant cable. It is used to interconnect governor and voltage paralleling circuits of generator sets operating in parallel (precise sets only).

3-142. MAINTENANCE OF PARALLELING CABLE.

a. Cleaning and Inspection.

(1) Clean paralleling cable (figure 3-50) with filtered compressed air and an electrician's brush or wipe with a clean, lint-free cloth lightly moistened with an approved solvent.

(2) Visually inspect paralleling cable for chafing, deterioration, and other damage.

(3) Check electrical connectors for bent or broken pins, stripped or damaged threads, cracks, corrosion and other damage.

b. Testing.

(1) Test individual wires for continuity with an ohmmeter or continuity light.

(2) Check between pins of each terminal for short circuits.

CAUTION

Do not use acid core solder on electrical wiring.

c. Repair. Replace damaged wires or connectors as follows:

(1) Loosen saddle clamp screws (figure 3-50).

(2) Tag wires and unsolder connections.

(3) Install replacement parts and solder connections.

(4) Tighten saddle clamp screws.

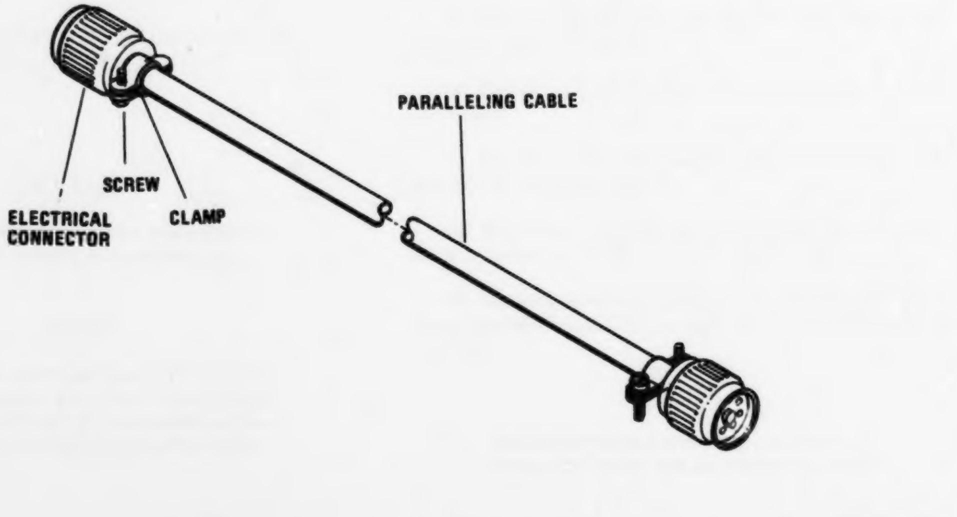


Figure 3-50. Repair of Paralleling Cable

CHAPTER 4

MATERIAL USED IN CONJUNCTION WITH THE GENERATOR SET

Section I. GENERAL

4-1. SCOPE.

This chapter contains instructions for operator and organizational maintenance of material used in conjunction with the generator set.

4-2. SERVICE UPON RECEIPT OF MATERIAL.

The following services shall be performed upon receipt of material used in conjunction with the generator set.

a. Remove the equipment from shipping container.

b. Check to see that all components are present.

c. Remove corrosion preventive compounds with an approved cleaning solvent.

d. Visually inspect all components for missing parts and damage which may have occurred during shipment.

e. Check all wiring for damage and loose connections.

Section II. FUEL BURNING WINTERIZATION KIT

4-3. GENERAL.

The fuel burning winterization kit is used to preheat the engine coolant and lubricating oil when ambient temperature is between −25°F (−31.7°C) and −65°F (−53.9°C). It consists of a heater coolant pump, coolant circulating lines, fuel line, electrical controls, wiring harness, and mounting hardware. The heater burns fuel from the generator set fuel tank to heat coolant from the engine block. The heated coolant is pumped through the heat exchanger in the engine oil pan, through the cylinder block, and returned to the engine block.

4-4. FUEL BURNING WINTERIZATION KIT INSTALLATION AND REPLACEMENT.

a. Installation.

CAUTION

Disconnect battery negative cable before installing fuel burning winterization kit.

NOTE

If generator set is equipped with an electric winterization kit, refer to paragraph 4-10 for installation of components which must be provided to accommodate both kits.

(1) Refer to pargraph 4-7 and remove heater assembly protective cover (43, figure 4-1).

(2) Refer to paragraph 3-31 and rain the engine cooling system.

(3) Remove "WATER" plug (44, figure 4-1) from center, right-rear of engine cylinder block. (Use impact wrench if necessary).

(4) Remove plug (45) from right side of engine water pump assembly.

(5) Remove 'WATER" plug (44) from center, left-rear of engine cylinder block.

(6) Remove plugs (46 and 47) from engine oil pan heat exchanger.

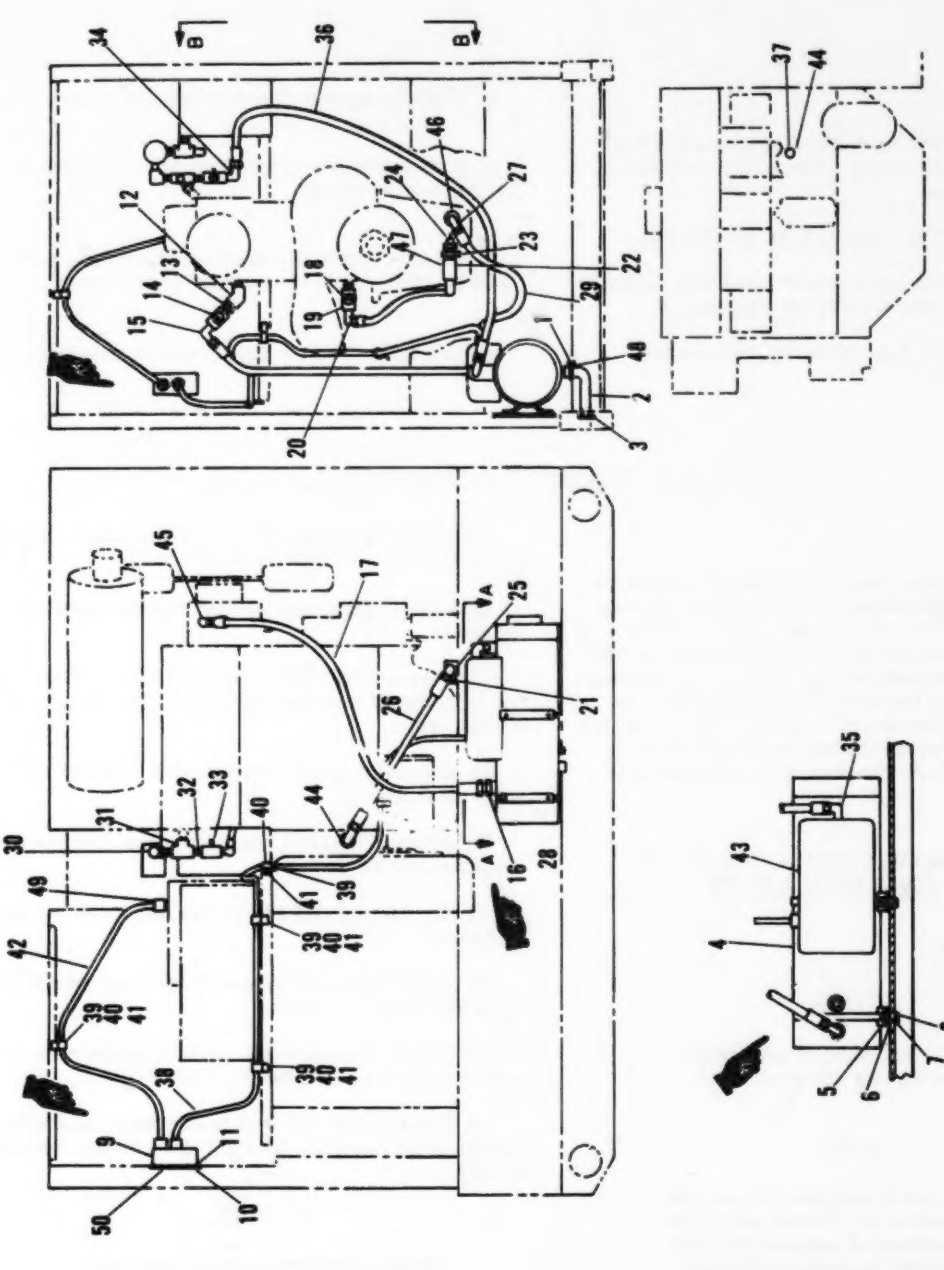
(7) Remove plate (48) located in skid base directly below heater mounting space.

(8) Remove protective cap (49) from special relay assembly connector J7 (figures FO-1 and FO-2).

(9) Remove cover (50) from heater control assembly mounting hole located to the right of the control cubicle assembly.

NOTE

Retain cover and attaching hardware. It is used to install heater control assembly.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ME 5-6115-465-12/4-1 (1)

Figure 4-1. Fuel Burning Winterization Kit Installation (Sheet 1 of 2)

1. Clamp
2. Exhaust pipe
3. Rain cap
4. Heater assembly
5. Screw
6. Flat washer
7. Lock washer
8. Nut
9. Heater control assembly
10. Screw & captive washer assembly
11. Nut
12. Elbow, 45 degree
13. Adapter
14. Valve
15. Elbow
16. Adapter
17. Coolant hose assembly
18. Pipe nipple
19. Valve
20. Elbow
21. Pipe nipple
22. Tee
23. Adapter
24. Pressure relief valve
25. Elbow
26. Coolant hose assembly
27. Elbow
28. Elbow
29. Coolant hose assembly
30. Street elbow
31. Tee
32. Pipe nipple
33. Valve
34. Elbow
35. Elbow
36. Fuel hose assembly
37. Thermostat switch
38. Wiring harness
39. Clamp
40. Screw & captive washer assembly
41. Nut
42. Wiring harness
43. Protective cover
44. Plug "WATER"
45. Plug
46. Plug
47. Plug
48. Plate
49. Cap
50. Cover

ME 5-6115-465-12/4-1 (2)

Figure 4-1. Fuel Burning Winterization Kit Installation (Sheet 2 of 2)

(10) Disconnect fuel line and remove elbow from fuel solenoid valve (paragraph 3-75).

(11) Install fuel burning winterization kit following the ascending sequence of index numbers (1 through 50) assigned to figure 4-1.

NOTE

Run wiring harnesses through existing clamps (39) as shown.

(12) Install elbow removed in step (10) above and connect fuel line.

(13) Fill cooling system with proper coolant (paragraph 3-31).

(14) Install heater assembly protective cover (paragraph 4-7).

(15) Loosen coolant hose(17, figure 4-1) at water pump assembly and open valve (19) to bleed air from heater assembly and coolant lines.

(16) Tighten coolant line and close valve.

(17) Add coolant to radiator as necessary.

b. Replacement.

(1) Removal.

(a) Refer to paragraph 3-31 and drain the engine cooling system.

(b) Remove fuel burning winterization kit in reverse order of steps (2) through (14) in paragraph 4-4a. above.

(c) Refer to paragraph 3-31 and service the engine cooling system with the proper coolant.

(2) Installation. Refer to paragraph 4-4a. above for installation procedures.

4-5. PREVENTIVE MAINTENANCE CHECKS AND SERVICES.

a. General. To insure that the fuel burning winterization kit is ready for operation at all times, it must be systematically inspected in order that defects be discovered and corrected before serious damage or failure of the equipment results. Defects discovered during operation shall be noted for correction as soon as operation ceases. Operation shall be ceased immediately if a defect which may cause damage to the equipment is noted. All defects and short comings shall be recorded, together with the corrective action taken on the applicable forms at the earliest opportunity. Army and Navy users shall accomplish the necessary preventive maintenance services listed and described in subparagraph b. below. Air Force users shall refer to the applicable inspection manual and work card sets in the T.O. 35C2-3 Series for periodic requirements and table 4-1 for detailed procedures. Marine Corps users should refer to the current issue of TM 11275/1.

b. Preventive Maintenance Checks and Services (Army and Navy).

(1) Operator. Table 4-1 contains a tabulated listing of preventive maintenance checks and services which shall be performed before, during, and after operation and the weekly checks and services to be performed by the operator. The item numbers are listed consecutively and indicate the sequence of minimum requirements. Refer to table 4-1 for checks and services.

(2) Organizational Maintenance. Table 4-1 also contains a tabulated listing of preventive maintenance checks and services which shall be performed by organizational maintenance personnel at monthly and semi-annual intervals. The item numbers are listed consecutively and indicate the sequence of minimum requirements. Refer to table 4-1 for checks and services.

4-6. TROUBLE SHOOTING.

Table 4-2 contains a list of malfunctions which is useful in diagnosing and correcting unsatisfactory operation or failure of the fuel burning winterization kit. Each malfunction is followed by an alphabetical listing of probable causes of the malfunction. The corresponding alphabetical listing of corrective actions contains references to applicable maintenance paragraphs for correcting the malfunction. The table lists only those malfunctions, probable causes and corrective actions which are within the scope of organizational maintenance. Any malfunction whose corrective action is beyond the scope of organizational maintenance shall be reported to higher level maintenance.

4-7. OPERATOR INSPECTION AND SERVICE OF FUEL BURNING WINTERIZATION KIT.

a. Inspection.

(1) Visually inspect heater assembly (4, figure 4-1) for insecure mounting, dents, cracks, corrosion, and other damage.

(2) Inspect fuel lines for cracks, breaks, loose connections and support clamps and other damage.

(3) Inspect electrical wiring for loose terminals or connectors, burned or frayed insulation, loose support clamps and other damage.

(4) Check coolant lines for loose connections, leaks, deterioration, and other damage.

b. Service.

(1) Loosen fasteners and remove protective cover (1, figure 4-2).

(2) Disconnect burner fuel line (2) and remove metering orifice assembly (3).

(3) Remove filter body (4) with gasket (5) and sintered filter (6) from heater assembly (7).

(4) Unscrew sintered filter (6) from filter body (4). Discard gasket (5).

(5) Clean metering orifice assembly, screen, and sintered filter in an approved solvent and dry with filtered compressed air.

(6) Hold orifice up to a light and check to make sure its pin hole is unobstructed.

(7) Screw sintered filter (6) into filter body (4) and install with new gasket (5) into heater assembly.

CAUTION

Use extreme care when installing the orifice assembly. Its pin hole can easily be clogged by any small particle of foreign matter.

(8) Install orifice assembly (3) and connect burner fuel line (2).

(9) Install protective cover (1) and tighten its fasteners.

4-8. ORGANIZATIONAL MAINTENANCE OF FUEL BURNING WINTERIZATION KIT.

a. Heater Control Assembly.

(1) Removal.

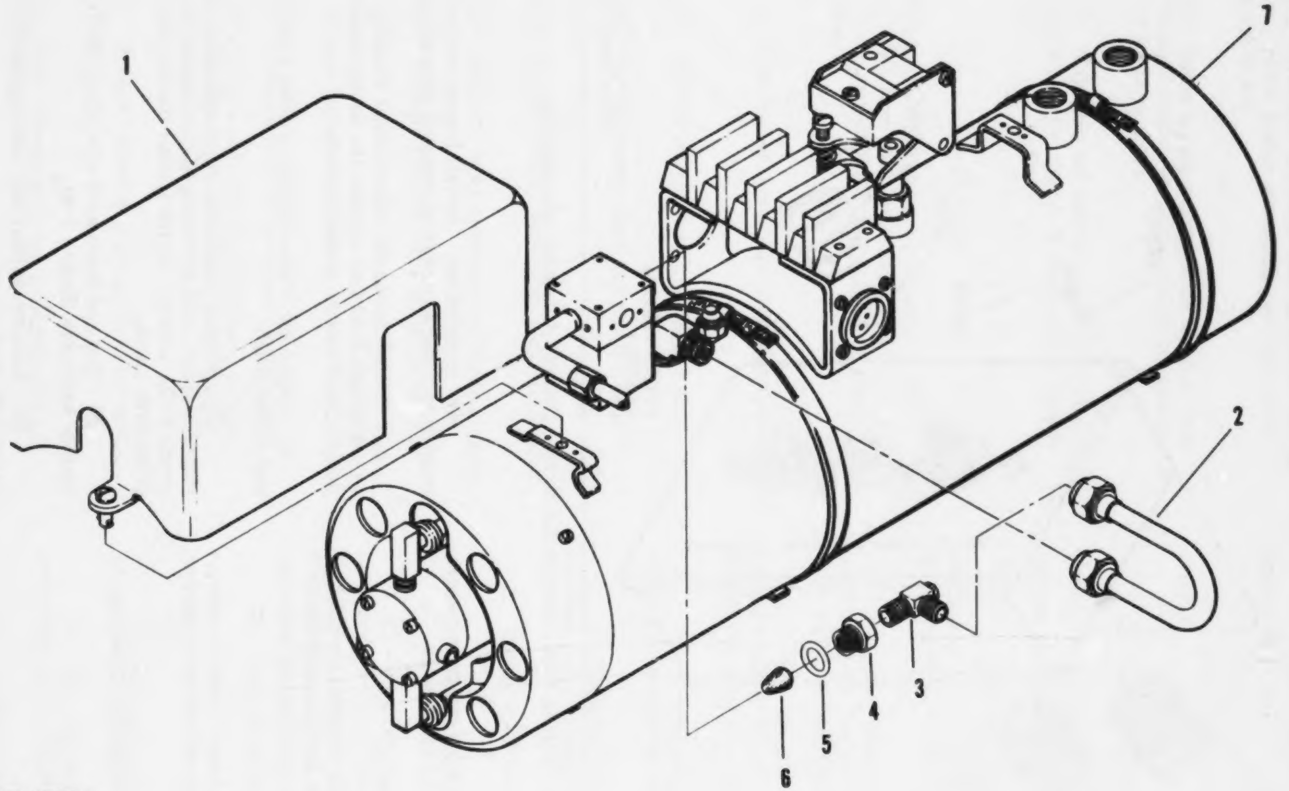
(a) Remove screws (figure 4-3) and washers.

Table 4-1. FUEL BURNING WINTERIZATION KIT PREVENTIVE MAINTENANCE CHECKS AND SERVICES

ITEM NUMBER	INTERVAL						B - BEFORE OPERATION D - DURING OPERATION A - AFTER OPERATION	DAILY - 8 HRS W - WEEKLY (40 HRS)	M - MONTHLY (100 HRS) S - SEMI-ANNUAL (500 HRS)
	OPERATOR				ORG				
	DAILY								
	B	D	A	W	M	S	ITEM TO BE INSPECTED	PROCEDURE	REFERENCE
1	X					X	Heater assembly	Visually inspect for damage and check for proper operation quarterly.	Figure 4-1
2	X		X			X	Fuel and coolant lines	Check for leaks before and after operation.	Figure 4-1
								Inspect for damage and tighten connections and support clamps quarterly.	
3	X	X		X			Heater control panel	Visually inspect for damage before operation weekly.	Para. 4-7
								Check for indicator light illumination during operation.	
4	X						Generator set fuel tank	Check for sufficient fuel supply.	Para. 2-10
5	X		X				Generator set radiator	Check for proper coolant level.	Para. 3-31
6					X	X	Regulator valve assembly	Service screen, metering orifice and sintered filter monthly. (More often under conditions of heavy usage.)	Para. 4-7
								Test output monthly. Service and adjust as necessary.	Para. 4-7
7						X	Flame switch	Adjust flame switch quarterly. (More often under conditions of heavy usage.	Para. 4-8
8						X	Limit switch	Inspect and test limit switch quarterly. (More often under conditions of heavy usage.)	Para. 4-8
9						X	Igniter	Inspect and test igniter quarterly. (More often under normal conditions.) Replace if necessary.	Para. 4-8
10						X	Wiring	Inspect wiring for burned or frayed insulation and loose terminals or connectors.	Para. 4-7
11						X	Thermostat switch	Test switch for proper operation. Replace if necessary.	Para. 4-8
12						X	Mounting hardware	Check for loose or missing mounting hardware.	Figure 4-1

Table 4-2. Fuel Burning Winterization Kit Trouble Shooting

MALFUNCTION	PROBABLE CAUSE	CORRECTIVE ACTION
Press-to-test indicator does not light when pressed	a. Discharged batteries. b. Circuit breaker open. c. Defective control assembly.	a. Recharge or replace batteries (para. 3-65). b. Reset circuit breaker (para. 2-22). c. Replace control assembly (para. 4-8).
Heater control switch placed in ON position but heater does not start	a. Circuit breaker open. b. Discharged batteries. c. Defective wiring harness. d. Defective control assembly.	a. Reset circuit breaker (para. 2-22). b. Replace or recharge batteries (para. 3-65). c. Replace damaged wiring harness (para. 4-4). d. Replace control assembly (para. 4-8).
Blower operates but heater does not ignite	a. Heater fuel shutoff valve closed. b. Generator set fuel supply exhausted. c. Restriction in fuel supply line. d. Defective thermostat switch. e. Defective igniter assembly. f. Regulator valve assembly screen, sintered filter or metering orifice clogged. g. Generator set fuel transfer pumps defective.	a. Open fuel shutoff valve (para. 2-22). b. Service generator set fuel supply (para. 3-49). c. Remove fuel line restriction. d. Test thermostat switch. Replace if necessary (para. 4-8). e. Inspect and test igniter assembly. Replace if necessary (para. 4-8). f. Service regulator valve assembly (para. 4-7). g. Replace fuel transfer pumps (para. 3-78).
Surging heater combustion	a. Restriction in fuel line. b. Defective generator set fuel transfer pumps. c. Defective igniter assembly.	a. Locate and remove restriction in fuel line. b. Replace fuel transfer pumps (para. 3-78). c. Inspect and test igniter assembly. Replace if necessary (para. 4-8).
Heater combustion continues after heater control switch placed in OFF position.	Flame switch out of adjustment.	Adjust flame switch (para. 4-8).
Heater does not complete purge cycle	Flame switch out of adjustment.	Adjust flame switch (para. 4-8).
Fan continues to operate after purge cycle	a. Flame switch out of adjustment. b. Incorrect wiring connections.	a. Adjust flame switch (para. 4-8). b. Check wiring for improper connections. Correct as necessary.



1. Protective cover
2. Burner fuel line
3. Metering orifice assembly
4. Filter body
5. Gasket
6. Sintered filter
7. Heater assembly

ME 5-6115-465-12/4-2

Figure 4-2. Fuel Burning Winterization Kit Heater Assembly, Inspection and Service

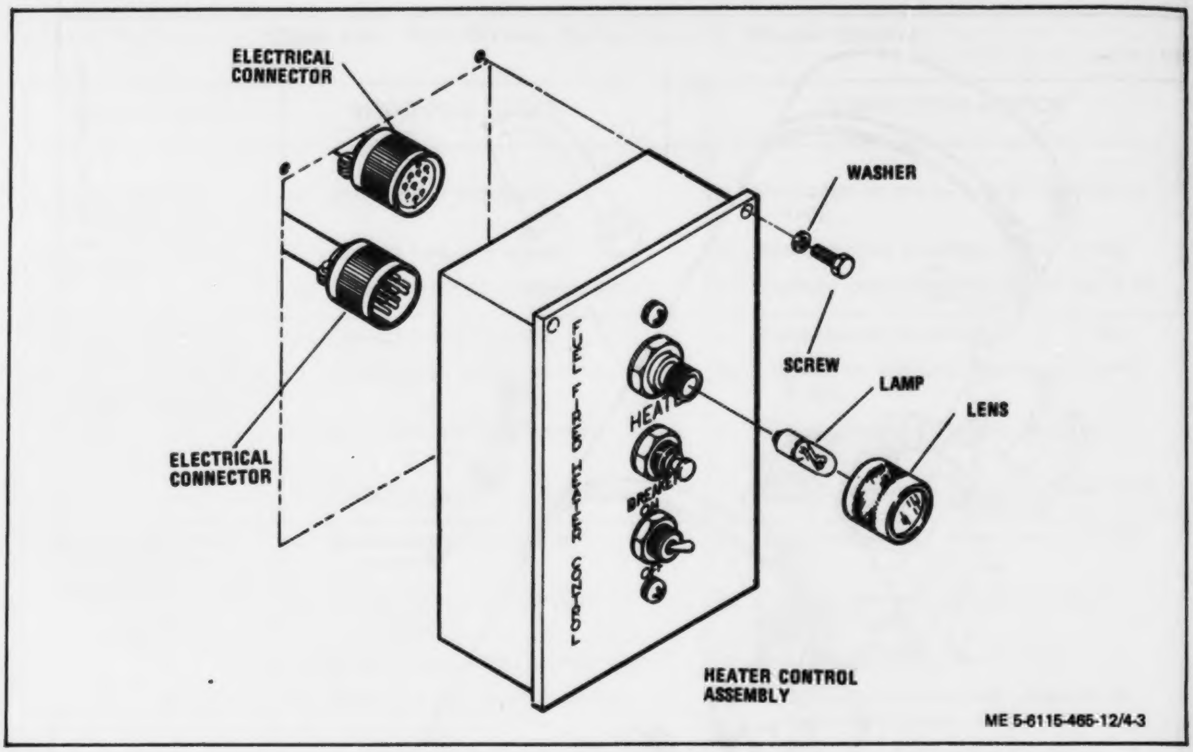


Figure 4-3. Fuel Burning Winterization Kit Heater Control Assembly Maintenance

(b) Pull control assembly out from generator set and disconnect electrical connectors.

(2) Cleaning and Inspection.

(a) Clean heater control assembly with filtered compressed air and an electrician's brush or wipe with a clean, lint-free cloth lightly moistened with an approved solvent.

(b) Visually inspect heater control assembly for cracks, corrosion, bent or broken connector pins and other damage.

(c) Replace control assembly if damage is noted.

(3) Lamp Replacement.

(a) Unscrew lens (figure 4-3).

(b) Depress lamp and rotate counterclockwise to remove from indicator light base.

(c) Insert replacement lamp into base. Depress and rotate clockwise to lock in position.

(d) Install lens.

(4) Installation. Install heater control assembly in reverse order of removal procedures.

b. Heater Assembly Operational Testing. Refer to paragraph 2-22 and operate the heater assembly to determine if heater is operational.

c. Regulator Valve Assembly Fuel Flow Check and Adjustment.

(1) Service regulator valve assembly screen, sintered filter, and metering orifice assembly (paragraph 4-7b. above). Do not install burner fuel line or protective cover.

(2) Tag and disconnect electrical lead to igniter assembly (figure 4-4).

(3) Remove screws and cover plate to expose brass adjusting screw.

(4) Connect one end of burner fuel line onto metering orifice assembly and position the other end to drain into a graduated container.

(5) Install a jumper wire across terminals of thermostat switch (37, figure 4-1).

(6) With fuel inlet line connected and fuel at the valve, place heater assembly into operation (paragraph 2-22).

(7) Using a stop watch, time the fuel flow into graduated container. Flow should measure 1/2 pint in 10 to 12 minutes.

(8) If flow is not within specified limits, rotate adjusting screw (figure 4-4) to obtain proper flow rate.

NOTE

Rotating adjusting screw clockwise increases flow rate; rotating adjusting screw counterclockwise decreases flow rate.

(9) Stop heater assembly operation (paragraph 2-22).

(10) Install burner fuel line (figure 4-4).

(11) Install cover plate and secure with screws.

(12) Install igniter assembly electrical lead.

(13) Install heater assembly protective cover.

(14) Remove jumper wire from thermostat switch.

d. Flame Switch Adjustment.

(1) Remove protective cover (figure 4-4).

(2) Using a suitable screwdriver, rotate flame switch adjusting screw counterclockwise until heater motor starts.

(3) Rotate adjusting screw clockwise until motor stops.

(4) Give adjusting screw an additional 1/2 (180 degrees) turn.

(5) Reinstall protective cover.

e. Igniter Assembly.

(1) Removal.

(a) Remove protective cover (figure 4-4).

(b) Tag and disconnect electrical lead to igniter assembly.

(c) Remove assembly from heater assembly.

(2) Cleaning, Inspection, and Testing.

(a) Clean igniter assembly in an approved solvent and dry thoroughly.

(b) Visually inspect igniter assembly for shorted or broken coil, cracks, corrosion, stripped or damaged terminal threads or other damage.

(c) Using an ohmmeter, check resistance between igniter casing and terminal. Resistance shall be two ohms.

(d) Ground igniter assembly casing and apply 24 Vdc to terminal. Igniter coil should heat to bright red color in a few seconds.

(e) Replace igniter assembly if it fails either inspection or test.

(3) Installation. Install igniter assembly in reverse order of removal procedures.

f. Terminal Board Assembly.

(1) Remove protective cover (figure 4-4).

(2) Visually inspect terminal board assembly for insecure mounting, loose electrical connections, stripped or otherwise damaged threads, cracks, corrosion, and burns or other damage.

(3) Install protective cover.

g. Limit Switch.

(1) Remove protective cover (figure 4-4).

(2) Visually inspect limit switch for cracks, corrosion and evidence of shorting or other damage.

(3) Tag and disconnect electrical leads to switch.

(4) Using a multimeter or similar device, check switch for continuity.

(5) Reconnect electrical leads to switch.

(6) Install protective cover.

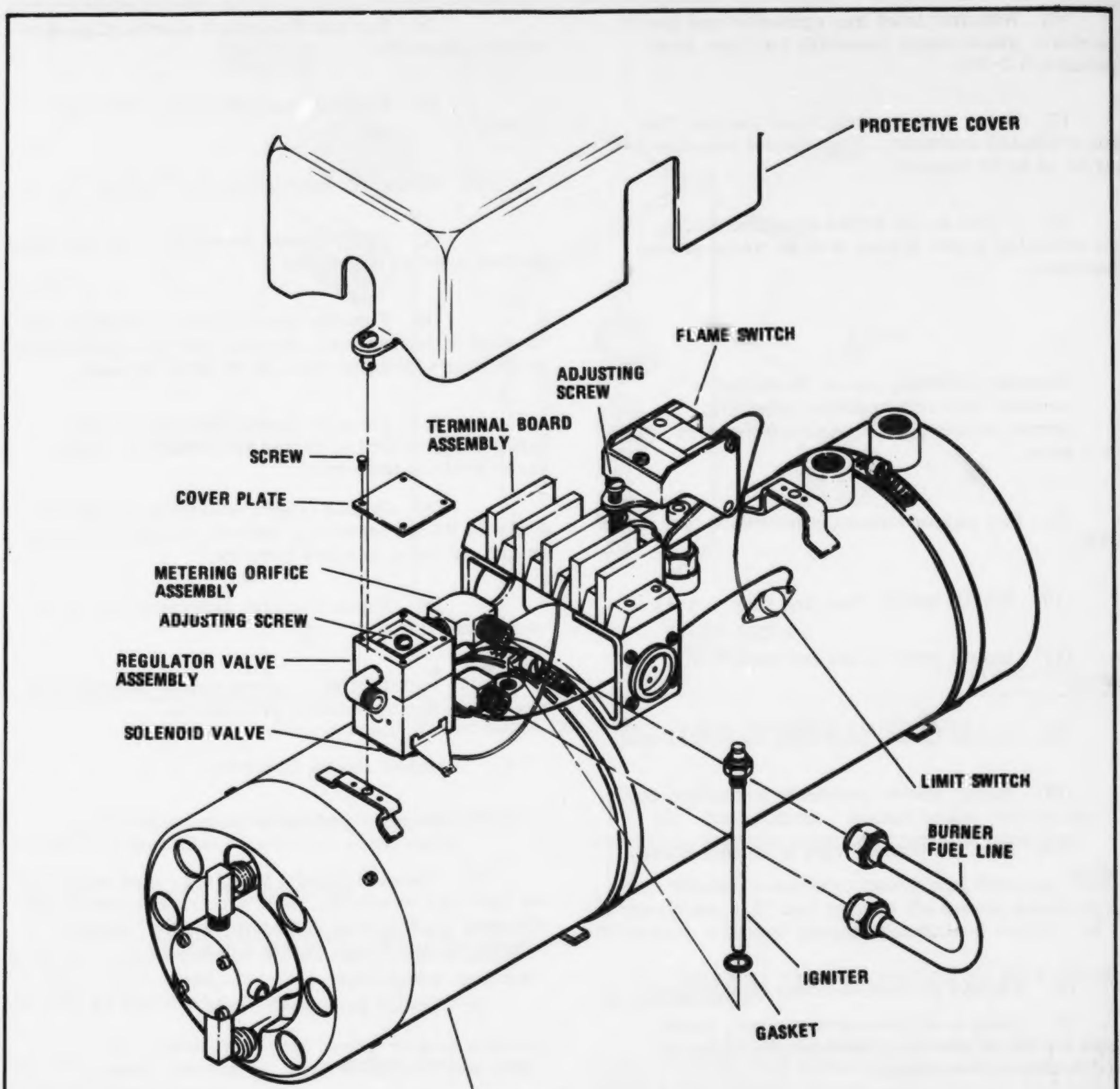

PROTECTIVE COVER
FLAME SWITCH
ADJUSTING SCREW
TERMINAL BOARD ASSEMBLY
SCREW
COVER PLATE
METERING ORIFICE ASSEMBLY
ADJUSTING SCREW
REGULATOR VALVE ASSEMBLY
SOLENOID VALVE
LIMIT SWITCH
BURNER FUEL LINE
IGNITER
GASKET
HEATER ASSEMBLY
ME 5-6115-465-12/4-4

Figure 4-4. Fuel Burning Winterization Kit Heater Assembly Maintenance

(7) If limit switch failed continuity test, report to higher level maintenance.

h. Thermostat Switch.

(1) Removal.

(a) Refer to paragraph -31 and drain the generator set radiator.

(b) Tag and disconnect electrical leads to thermostat (37, figure 4-1).

(c) Remove thermostat switch.

(2) Cleaning and Inspection.

(a) Clean thermostat switch with an approved solvent and dry thoroughly with filtered compressed air.

(b) Visually inspect switch for cracks, corrosion, stripped or damaged threads, and evidence of shorting or other damage.

(3) Testing.

(a) Suspend thermostat switch in a container of clean water so that its temperature sensor is completely immersed in water, but not touching the bottom or sides of the container.

(b) Suspend a reliable thermometer in the water so that is temperature sensing end is under water but not touching the sides or bottom of the container.

(c) Connect an ohmmeter across the terminals of the thermostat switch.

(d) Gradually heat the water stirring constantly to evenly distribute the heat.

(e) Observe both the ohmmeter and thermometer. The ohmmeter should indicate continuity up to a temperature of 155 ± 5°F (68.4 ± 2.8°C). Above this temperature, the ohmmeter should indicate an open circuit.

(f) Remove the heat and allow the water to cool.

(g) Ohmmeter should indicate continuity at a temperature of +135 ± 5°F (+56.2 ± 2.8°C).

(h) Replace thermostat switch if it is damaged or fails to operate properly.

(4) Installation. Install thermostat switch in reverse order of removal procedures.

Section III. ELECTRIC WINTERIZATION KIT

4-9. GENERAL.

The electric winterization kit uses an external power source to maintain the engine coolant and lubricating oil at normal operating temperature in situations which require immediate starting of the generator set. The kit will function effectively down to an ambient temperature of -65°F (-53.9°C). Coolant from the radiator is pumped into the heater assembly where it is heated by the heater elements. From the heater assembly, the heated coolant passes through the heat exchanger in the engine crankcase to heat the lubricating oil. After leaving the heat exchanger, the coolant is pumped through the cylinder block and returned to the radiator. The electric winterization kit may be installed on a generator set which is equipped with a fuel burning winterization kit. Power for operation of the kit may be obtained from any 205 to 240 volt, 50/60 Hz or 400 Hz, single phase source.

4-10. ELECTRIC WINTERIZATION KIT INSTALLATION AND REPLACEMENT.

a. Installation.

(1) Drain generator set cooling system (paragraph 3-31)

(2) Remove "WATER" plug (68, figure 4-5) from center, right-rear of engine cylinder block.

(3) Remove plug (69) from right side of engine water pump assembly.

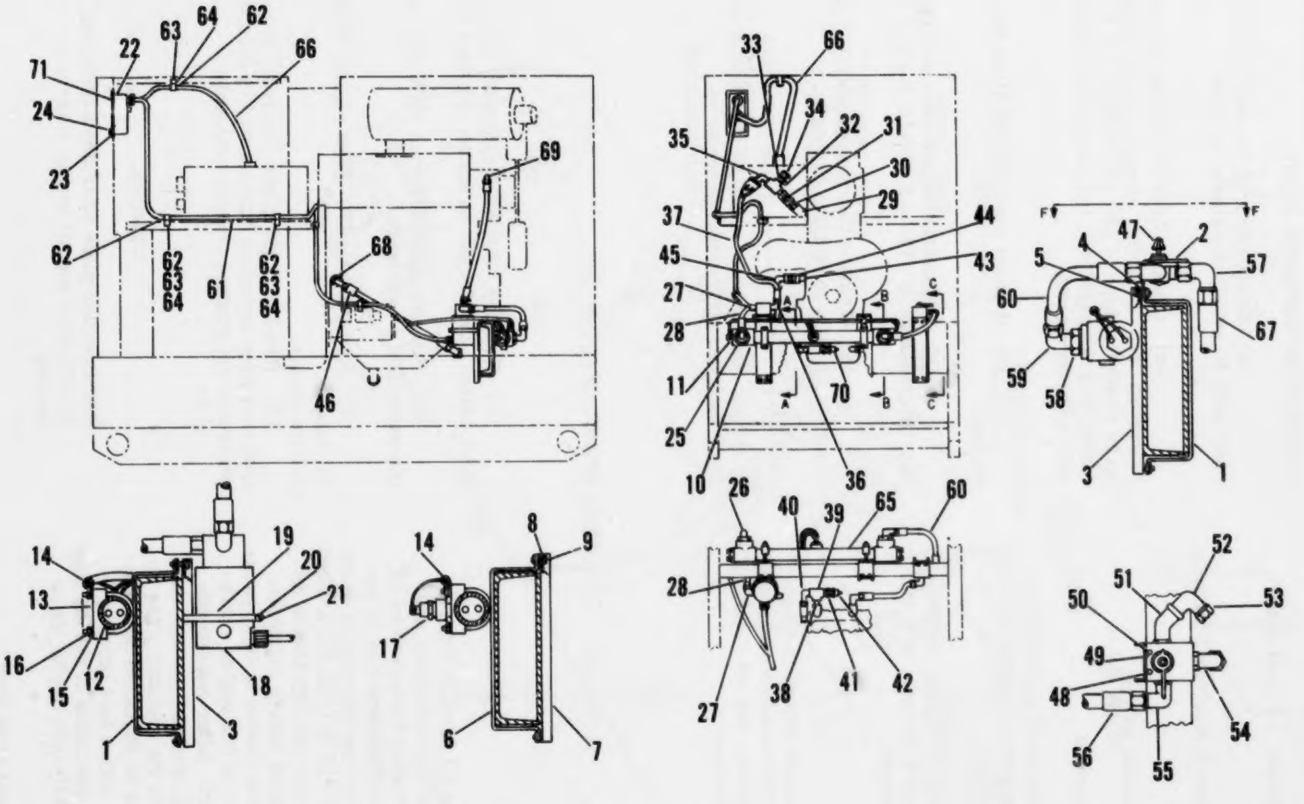
(4) Remove plug (70) from engine oil pan heat exchanger.

(5) Remove cover plate (71) from heater control assembly mounting hole located to the right of the generator set control cubicle assembly.

NOTE

Retain cover plate attaching hardware. It is used to install heater control assembly.

(6) Install electric winterization kit by following the ascending sequence of index numbers (1 through 71) assigned to figure 4-5.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ME 5-6115-465-12/4-5 (1)

Figure 4-5. Electric Winterization Kit Installation (Sheet 1 of 2)

1. Bracket
2. Bracket
3. Bracket
4. Lockwasher
5. Screw
6. Bracket
7. Bracket
8. Lockwasher
9. Screw
10. Pipe tee
11. Heating element
12. Pipe
13. Clamp
14. Clamp
15. Lockwasher
16. Nut
17. Thermostat switch
18. Pump and motor assembly
19. Clamp
20. Lockwasher
21. Nut
22. Heater control assembly
23. Lockwasher
24. Screw
25. Reducer
26. Elbow
27. Elbow
28. Coolant hose assembly
29. Street elbow
30. Pipe coupling
31. Shutoff cock
32. Street tee
33. Straight adapter
34. Tube cap
35. Elbow
36. Elbow
37. Coolant hose assembly
38. Pipe adapter
39. Tee
40. Elbow
41. Adapter
42. Pressure relief valve
43. Pipe adapter
44. Valve
45. Elbow
46. Coolant hose assembly
47. Three-way valve
48. Screw
49. Lockwasher
50. Nut
51. Street elbow, 45 degree
52. Elbow
53. Tube cap
54. Elbow
55. Elbow
56. Coolant hose assembly
57. Elbow
58. Reducer
59. Elbow
60. Coolant hose assembly
61. Wiring harness
62. Clamp
63. Screw & captive washer assembly
64. Nut
65. Tubing
66. Wiring harness
67. Hose assembly
68. Plug
69. Plug
70. Plug
71. Cover plate

ME 5-6115-465-12/4-5 (2)

Figure 4-5. Electric Winterization Kit Installation (Sheet 2 of 2)

NOTE

Coat threads of all pipe fittings with sealing compound conforming to Military Specification MIL-S-22743, Grade HVV prior to installation.

NOTE

Tube caps (34 and 53) are to be removed and stored in the generator set tool box and tee (32) and straight adapter (33) installed if fuel burning winterization kit is to be installed.

(7) Run wiring harness through existing clamps (62) where indicated.

(8) Connect external power wiring harness to heater control assembly.

(9) Slide shrink tubing (65) over all screw terminals and shrink.

(10) Loosen coolant hose assembly (28) at elbow (26). Place three way valve (47) in open position and open valves (31) and (44).

(11) Service generator set cooling system (paragraph 3-31) and allow air to bleed from winterization kit.

(12) Tighten coolant hose assembly and close valves.

(13) Add coolant to generator set cooling system as necessary.

b. Replacement.

(1) Removal.

(a) Drain generator set cooling system (paragraph 3-31).

(b) Remove electric winterization kit in reverse order of steps a. (2) through a. (8) above.

(c) Service generator set cooling system.

(2) Installation. Refer to paragraph 4-10a. above for installation instructions.

4-11. PREVENTIVE MAINTENANCE CHECKS AND SERVICES.

a. General. To insure that the electric winterization kit is ready for operation at all times, it must be systemtically inspected in order that defects be discovered and corrected before serious damage or failure of the equipment results. Defects discovered during operation shall be noted for correction to be made as soon as operation ceases. Operation shall be ceased immediately if a defect which may cause damage to the equipment is noted. All defects and short comings shall be recorded together with the corrective action taken on the applicable forms at the earliest opportunity. Army and Navy users shall accomplish the preventive maintenance checks and services listed and described in subparagraph b. below. Air Force users shall refer to the applicable inspection manuals and work card sets in the T.O. 35C2-3 Series for periodic requirements and table 4-3 for detailed procedures. Marine Corps users should refer to the current issue of TM 11275/1.

b. Preventive Maintenance Checks and Services (Army and Navy).

(1) Operator. Table 4-3 contains a tabulated listing of preventive maintenance checks and services which shall be performed before, during and after operation and the weekly checks and services to be performed by the operator. The item numbers are listed consecutively and indicate the sequence of minimum requirements. Refer to table 4-3 for checks and services.

(2) Organizational Maintenance. Table 4-3 also contains a tabulated listing of preventive maintenance checks and services which shall be performed by organizational maintenance personnel at monthly and semi-annual intervals. The item numbers are listed consecutively and indicate the sequence of minimum requirements. Refer to table 4-3 for checks and services.

4-12. TROUBLE SHOOTING.

Table 4-4 contains a list of malfunctions which is useful in diagnosing and correcting unsatisfactory operation or failure of the electric winterization kit. Each malfunction is followed by an alphabetical listing of probable causes of the malfunction. The corresponding listing of corrective actions contains references to the applicable maintenance paragraphs for correcting the malfunction. The table lists only those malfunctions, probable causes and corrective actions which are within the scope of organizational maintenance. Any malfunction whose causes and corrective actions are beyond the scope of organizational maintenance shall be reported to higher level maintenance.

4-13. OPERATOR'S MAINTENANCE OF ELECTRIC WINTERIZATION KIT.

a. Coolant Pump Assembly.

(1) Inspect pump (18, figure 4-5) for cracks, breaks, corrosion and leaks.

(2) Check pump for discoloration or other signs of overheating.

b. Coolant Hoses and Fittings.

(1) Inspect coolant hoses (46, figure 4-5) for damage and deterioration.

(2) Check fittings and valves for loose connections and leaks.

c. Wiring Harnesses. Check wiring harness (61, 66, figure 4-5) for frayed, burned, or deteriorated insulation, insecure support clamps, and loose connections.

d. Indicator Lights.

(1) Inspection. Inspect indicator lights (figure 4-6) for cracked or broken lens, corrosion, and other damage.

(2) Testing.

(a) Close circuit breaker (figure 4-6) to apply power to control assembly.

(b) Depress indicator light lens. If lamp is operating, it will illuminate.

(c) Open circuit breaker.

(3) Lamp Replacement.

(a) Unscrew lens (figure 4-6).

(b) Depress and rotate lamp counterclockwise to remove.

Table 4-3. ELECTRIC WINTERIZATION KIT PREVENTIVE MAINTENANCE CHECKS AND SERVICES

ITEM NUMBER	INTERVAL						B - BEFORE OPERATION D - DURING OPERATION A - AFTER OPERATION	DAILY - 8 HRS W - WEEKLY (40 HRS)	M - MONTHLY (100 HRS) S - SEMI-ANNUAL (500 HRS)
	OPERATOR				ORG				
	DAILY								
	B	D	A	W	M	S	ITEM TO BE INSPECTED	PROCEDURE	REFERENCE
1	X		X				Power cable	Check that power cable is connected to power supply before operation. Disconnect after operation.	Para. 4-10
2	X		X				Coolant line valves	Check that all coolant line valves are in the proper position for operation. Close all coolant line valves after operation.	Para. 4-10
3	X		X				Generator set radiator	Check for proper coolant level.	Para. 3-31
4	X	X	X			X	Coolant lines	Check coolant lines for leaks before, during, and after operation. Inspect condition and tighten connections quarterly.	Figure 4-5
5				X		X	Wiring harnesses	Check for frayed insulation and loose connectors or terminals.	Figure 4-5
6						X	Coolant pump	Check for proper operation.	Para. 4-14
7	X			X		X	Control assembly	Check for damage and test indicator lights.	Para. 4-13
8						X	Thermostat	Test for proper operation.	Para. 4-14
9						X	Heater assembly	Inspect and test.	Para. 4-10
10						X	Attaching hardware	Check for loose or missing attaching hardware. Tighten or replace as necessary.	Figure 4-5

Table 4-4. Electric Winterization Kit Troubleshooting

MALFUNCTION	PROBABLE CAUSE	CORRECTIVE ACTION
ON-OFF switch ON position but heaters and pump not operating	a. Power cable not connected to power supply.	a. Connect power cable (figure 4-5).
	b. Circuit breaker not closed.	b. Close circuit breaker (para. 2-23).
	c. Defective circuit breaker.	c. Replace circuit breaker (para. 4-14).
	d. Defective ON-OFF switch.	d. Replace ON-OFF switch (para. 4-14).
	e. Blown fuse.	e. Replace fuse (para. 4-14).
	f. Defective wiring.	f. Check wiring. Repair or replace if necessary (para. 4-13).
Heaters inoperative	a. Defective ON-OFF switch.	a. Replace ON-OFF switch (para. 4-14).
	b. Defective thermostat switch.	b. Replace ON-OFF switch (para. 4-14).
	c. Defective wiring.	c. Test wiring. Repair or replace if necessary (para. 4-14).
	d. Defective heater element.	d. Test heater elements. Replace if necessary (para. 4-14).
Pump inoperative.	a. Defective ON-OFF switch.	a. Replace ON-OFF switch (para. 4-74).
	b. Defective wiring.	b. Inspect and test wiring. Repair or replace as necessary (para. 4-14).
Indicator light inoperative	a. Defective lamp.	a. Replace lamp (para. 4-13).
	b. Defective wiring.	b. Inspect and test wires. Repair or replace if necessary (para. 4-14).

(c) Insert replacement lamp. Depress and rotate clockwise to lock.

(d) Install lens.

e. Fuse.

(1) Remove fuse holder cap (figure 4-6).

(2) Withdraw fuse from fuse holder.

(3) Clean fuse with a clean, lint-free cloth lightly moistened with an approved solvent.

(4) Visually inspect fuse for cracks or broken glass, corrosion, and metled conductor.

(5) Use an ohmmeter, check fuse for continuity.

(6) Replace fuse if unserviceable.

(7) Insert fuse into fuse holder and install fuse holder cap.

4-14. ORGANIZATIONAL MAINTENANCE OF ELECTRIC WINTERIZATION KIT.

a. Indicator Light Assembly.

(1) Removal.

(a) Remove screws (1, figure 4-7) and washers (2) and pull control box out from generator set.

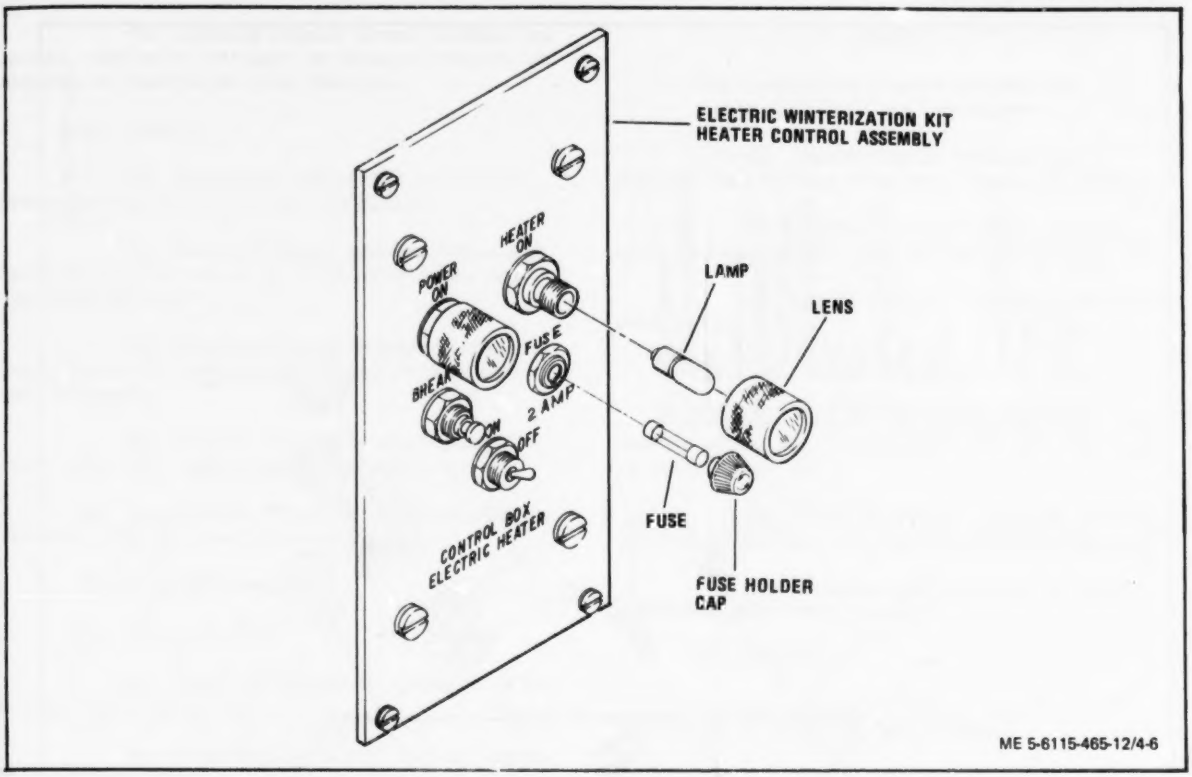

ELECTRIC WINTERIZATION KIT
HEATER CONTROL ASSEMBLY
HEATER ON
POWER ON
FUSE
2 AMP
BREAKER
ON
OFF
CONTROL BOX
ELECTRIC HEATER
LAMP
LENS
FUSE
FUSE HOLDER
CAP
ME 5-6115-465-12/4-6

Figure 4-6. Electric Winterization Kit Control Assembly Indicator Lamp Fuse Replacement

(b) Tag and disconnect electrical connectors from control box.

(c) Remove screws (3) and carefully pull panel assembly (4) away from control box.

(d) Tag and disconnect electrical leads to indicator light assembly.

(e) Unscrew lens (5) and remove lamp (6).

(f) Remove nut (7) and tooth lockwasher (9) to remove nut (10) and base (8).

(g) Do not remove nut from base.

(2) Cleaning and Inspection.

(a) Clean indicator light assembly with filtered compressed air and a soft bristle brush or wipe with a clean, lint-free cloth lightly moistened with an approved solvent.

(b) Visually inspect indicator light assembly for cracks, corrosion, stripped or damaged threads and evidence of shorting or other damage.

(c) Replace indicator light assembly if damaged beyond simple repair.

(3) Installation. Install indicator light assembly in reverse order of removal procedures.

b. Circuit Breaker.

(1) Removal.

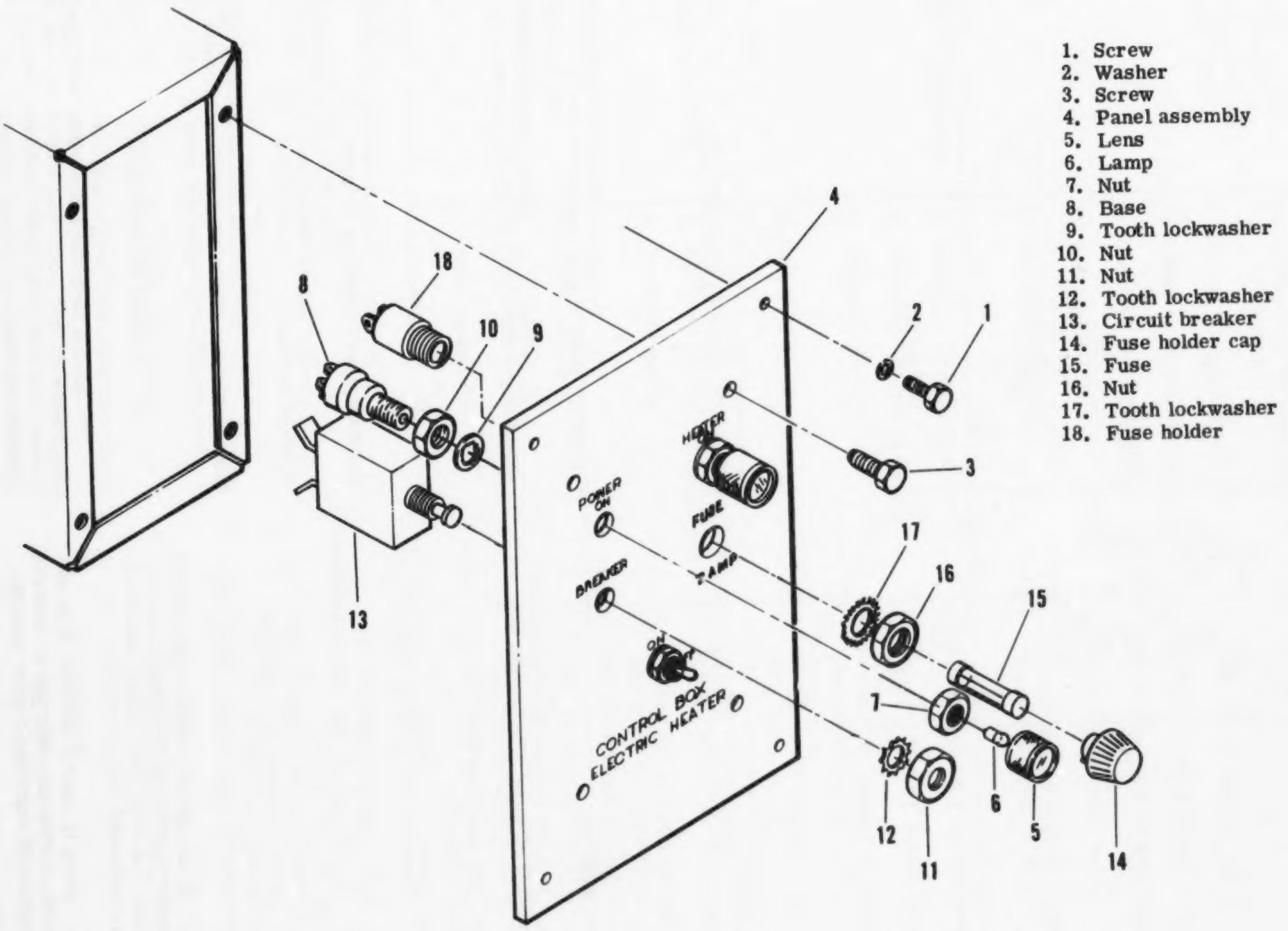
(a) Gain access to interior of control box (paragraph (a) through (c) above.

(b) Tag and disconnect electrical leads to circuit breaker.

(c) Remove nut (11, figure 4-7) and tooth lockwasher (12) to remove circuit breaker (13).

(2) Cleaning and Inspection.

(a) Clean circuit breaker with filtered compressed air and electrician's brush or wipe with a clean, lint-free cloth lightly moistened with an approved solvent.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HEATER
FUSE
LAMP
POWER ON
BREAKER
ON
CONTROL BOX
ELECTRIC HEATER

1. Screw
2. Washer
3. Screw
4. Panel assembly
5. Lens
6. Lamp
7. Nut
8. Base
9. Tooth lockwasher
10. Nut
11. Nut
12. Tooth lockwasher
13. Circuit breaker
14. Fuse holder cap
15. Fuse
16. Nut
17. Tooth lockwasher
18. Fuse holder

ME 5-6115-465-12/4-7

Figure 4-7. Electric Winterization Kit Control Assembly, Exploded View (Sheet 1 of 2)

(b) Visually inspect circuit breaker for cracks, corrosion, stripped or damaged threads and evidence of shorting or other damage.

(3) Testing.

(a) Connect an ohmmeter or similar device across circuit breaker terminals.

(b) Pull out circuit breaker button and check ohmmeter indication. Ohmmeter shall indicate open circuit.

(c) Depress circuit breaker button and check ohmmeter indication. Ohmmeter shall indicate continuity.

(d) Replace circuit breaker if the above continuity requirements are not met.

(4) Installation. Install circuit breaker in reverse order of removal procedures.

c. Fuse Holder Assembly.

(1) Removal.

(a) Tag and disconnect electrical leads to fuse holder assembly.

(b) Remove fuse holder cap (14, figure 4-7) and fuse (15).

(c) Remove nut (16) and tooth lockwasher (17) to remove fuse holder (18).

(2) Cleaning, Inspection, and Repair.

(a) Clean fuse holder assembly parts with a clean, lint-free cloth lightly moistened with an approved solvent.

(b) Visually inspect fuse holder and fuse holder caps for cracks, corrosion, and stripped or otherwise damaged threads.

(c) Inspect fuse for cracked or broken glass, corrosion, and melted conductor.

(d) Use an ohmmeter to check fuse for continuity.

(e) Replace damaged or defective parts.

(3) Installation. Install fuse holder assembly in reverse order of removal instructions.

d. ON-OFF Switch. Visually inspect ON-OFF switch (figure 4-7) for insecure mounting, loose electrical connections, cracks, corrosion and other damage.

e. Coolant Pump and Motor Assembly.

(1) Motor Brushes Replacement.

NOTE

Note position of brushes as they are removed to facilitate installation

(a) Remove brush retainer caps, springs, and brushes from pump assembly motor.

(b) Measure brush length. Brushes shall be replaced if length is 3/16 inch or less.

(c) Install brushes, springs, and brush retainer caps.

(2) Cleaning and Inspection.

(a) Clean coolant pump and motor assembly with an approved solvent and dry with filtered compressed air.

(b) Visually inspect motor for cracks, corrosion, evidence of shorting and other damage.

(c) Visually inspect pump for cracks, corrosion, and other damage.

(3) Testing.

(a) Check that three-way valve (47, figure 4-5) is in the CLOSED position.

(b) Disconnect coolant hose assembly (67) from elbow (57) in three-way valve and position to drain into a three gallon container.

(c) Remove generator set radiator cap.

(d) Place ON-OFF switch (figure 4-7) in the ON position.

(e) Note time required to fill container. Time shall be approximately three minutes.

(f) Place ON-OFF switch in the OFF position and reconnect coolant hose assembly.

(g) Replace pump and motor assembly if it fails to function properly.

(h) Service generator set cooling system (paragraph 3-31).

(i) Install coolant hoses and service cooling system (paragraph 3-31) if pump functions properly.

f. Thermostat Switch.

(1) Removal.

(a) Refer to paragraph 3-31 and drain the radiator.

(b) Tag and disconnect electrical leads to thermostat switch (17, figure 4-5).

(c) Remove thermostat.

(2) Cleaning and Inspection.

(a) Clean thermostat switch with an approved solvent and dry thoroughly with filtered compressed air.

(b) Visually inspect thermostat switch for cracks, corrosion, evidence of shorting, stripped or damaged threads and other damage.

(3) Testing.

(a) Suspend thermostat switch in a container of clean water so that its temperature sensor is completely immersed but not touching the sides or bottom of the container.

(b) Suspend a reliable thermometer in the container so that its temperature sensing end is immersed but not touching the sides or bottom of the container.

(c) Connect an ohmmeter across the terminals of the thermostat switch. Check that ohmmeter indicates continuity.

(d) Gradually heat container, stirring constantly to evenly distribute heat.

(e) Observe both thermometer and ohmmeter. Ohmmeter should indicate continuity up to a temperature of $150^{\circ}F \pm 5^{\circ}F$ ($65.6^{\circ}C \pm 2.8^{\circ}C$). Above this temperature, ohmmeter should indicate open circuit.

(f) Remove heat and allow the container to cool while observing thermometer and ohmmeter.

(g) Ohmmeter should indicate continuity at a temperature of $130^{\circ}F \pm 5^{\circ}F$ ($54.4^{\circ}C \pm 2.8^{\circ}C$).

(h) Replace thermostat switch if it fails to operate properly.

(4) Installation. Install thermostat switch in reverse order of removal procedures.

g. Heating Elements.

(1) Removal.

(a) Drain engine cooling system (paragraph 3-31).

(b) Tag and disconnect electrical leads to heating elements (11, figure 4-5).

(c) Unscrew heating elements from pipe (12).

(2) Cleaning and Inspection.

(a) Clean heating elements with an approved solvent and dry thoroughly with filtered compressed air.

(b) Visually inspect heating elements for cracks, breaks, corrosion, stripped or damaged threads, evidence of shorting, or other damage.

(3) Testing.

(a) Using an ohmmeter, check for open circuit between heater element terminal and casing. Ohmmeter shall indicate open circuit.

(b) Check resistance across terminals. Resistance shall be 30 ± 3 ohms.

(c) Replace heater element which does not test properly.

(4) Installation. Install heating element in reverse order of removal procedures.

h. Coolant Hoses and Fittings.

(1) Removal. Remove damaged coolant hoses and fittings by following the ascending numerical sequence of index numbers assigned to figure 4-5.

NOTE

Only those hoses and fittings requiring replacement need be removed.

(2) Installation. Install coolant hoses and fittings in reverse order of removal procedures.

i. Wiring Harnesses.

(1) Removal. Remove wiring harness assembly terminals and connectors as required for access to other components and testing or replacement of damaged parts.

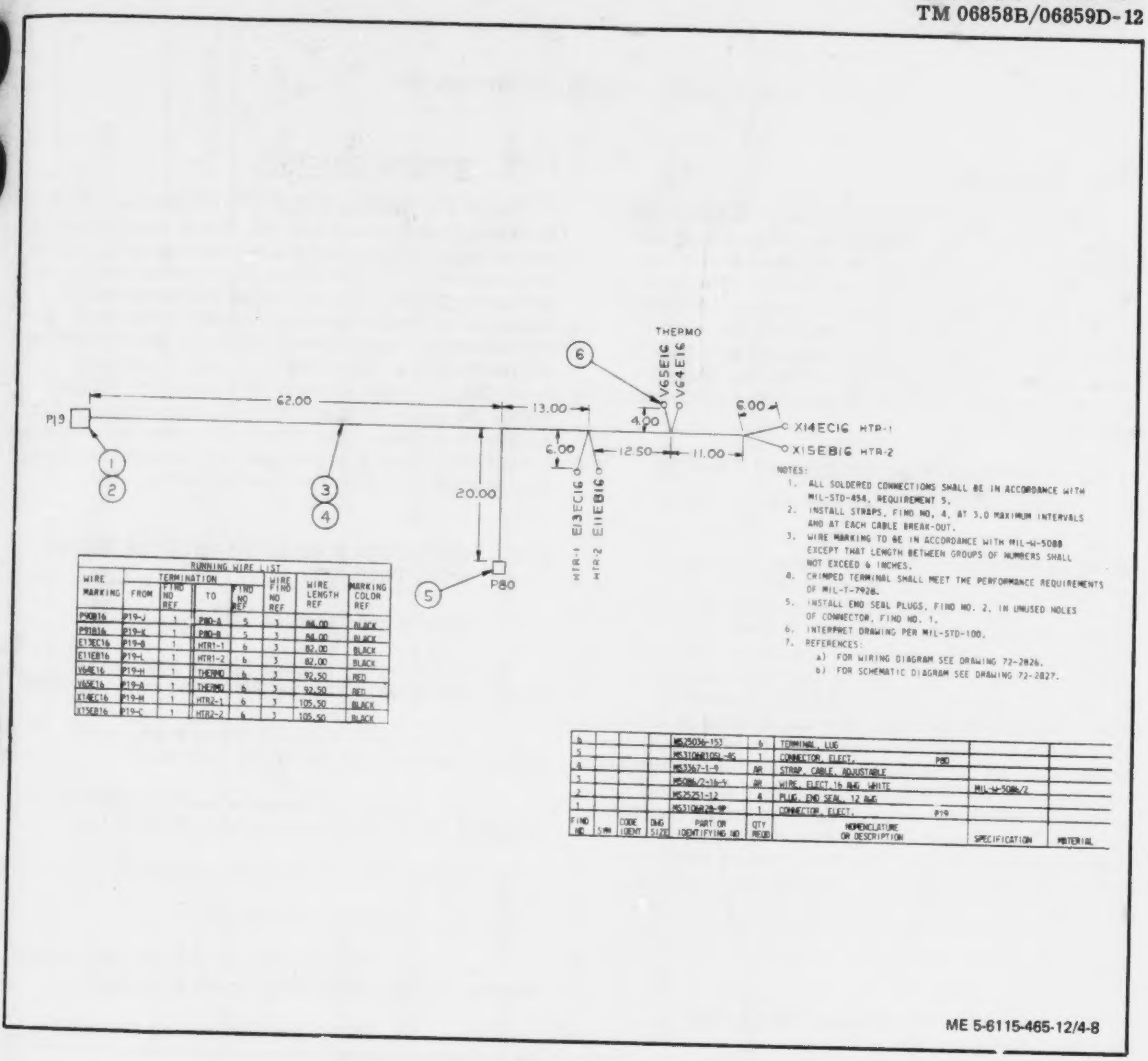
NOTE

Tag or otherwise identify electrical leads, terminals, and connectors and wiring harness support clamps before removal to facilitate installation.

(2) Cleaning and Inspection.

(a) Clean wiring harness with filtered compressed air and an electrician's brush or wipe with a clean, lint-free cloth lightly moistened with an approved solvent.

(b) Visually inspect wiring harness for burned, bent, corroded or otherwise damaged terminals.



RUNNING WIRE LIST							
WIRE MARKING	TERMINATION				WIRE FIND NO REF	WIRE LENGTH REF	MARKING COLOR REF
	FROM	FIND NO REF	TO	FIND NO REF			
P90B16	P19-J	1	P80-A	5	3	84.00	BLACK
P91B16	P19-K	1	P80-B	5	3	84.00	BLACK
E13EC16	P19-B	1	HTR1-1	6	3	82.00	BLACK
E11EB16	P19-L	1	HTR1-2	6	3	82.00	BLACK
V64E16	P19-H	1	THERMO	6	3	92.50	RED
V65E16	P19-A	1	THERMO	6	3	92.50	RED
X14EC16	P19-M	1	HTR2-1	6	3	105.50	BLACK
X15EB16	P19-C	1	HTR2-2	6	3	105.50	BLACK

NOTES:

1. ALL SOLDERED CONNECTIONS SHALL BE IN ACCORDANCE WITH MIL-STD-454, REQUIREMENT 5.
2. INSTALL STRAPS, FIND NO, 4, AT 3.0 MAXIMUM INTERVALS AND AT EACH CABLE BREAK-OUT.
3. WIRE MARKING TO BE IN ACCORDANCE WITH MIL-W-5088 EXCEPT THAT LENGTH BETWEEN GROUPS OF NUMBERS SHALL NOT EXCEED 6 INCHES.
4. CRIMPED TERMINAL SHALL MEET THE PERFORMANCE REQUIREMENTS OF MIL-T-7928.
5. INSTALL END SEAL PLUGS, FIND NO. 2, IN UNUSED HOLES OF CONNECTOR, FIND NO. 1.
6. INTERPRET DRAWING PER MIL-STD-100.
7. REFERENCES:
   a) FOR WIRING DIAGRAM SEE DRAWING 72-2826.
   b) FOR SCHEMATIC DIAGRAM SEE DRAWING 72-2827.

FIND NO	SYM	CODE IDENT	DWG SIZE	PART OR IDENTIFYING NO	QTY REQD	NOMENCLATURE OR DESCRIPTION	SPECIFICATION	MATERIAL
6				MS25036-153	6	TERMINAL, LUG		
5				MS3106R10SL-4S	1	CONNECTOR, ELECT. P80		
4				MS3367-1-9	AR	STRAP, CABLE, ADJUSTABLE		
3				M5086/2-16-5	AR	WIRE, ELECT.16 AWG WHITE	MIL-W-5086/2	
2				MS25251-12	4	PLUG, END SEAL, 12 AWG		
1				MS3106R20-9P	1	CONNECTOR, ELECT. P19		

ME 5-6115-465-12/4-8

Figure 4-8. Electric Winterization Kit Wiring Harness, Dwg. No. 72-2855

(c) Inspect connectors for cracks, corrosion, stripped or otherwise damaged threads, bent or broken pins and other damage.

(d) Check insulation for burns, deterioration and chafing.

(e) Replace any damaged parts.

(3) Testing. Test continuity of individual wires using a multimeter or continuity light, using figure 4-8 as a guide.

CAUTION

Do not use acid core solder on electrical components.

(4) Repair. Replace damaged wires, terminals, and connectors by unsoldering connections, installing replacement parts and soldering.

NOTE

If more than 30 percent of the wires are damaged, the wiring harness shall be replaced.

(5) Installation. Install wiring harness in reverse order of removal procedures.

Section IV. WHEEL MOUNTING KIT

4-15. GENERAL.

The wheel mounting kit provides added mobility for the generator set. It consists of two wheel axle assemblies. The front axle is equipped with a towbar, pintle and safety chain for towing. The front wheels are free to pivot up to 40 degrees for steering. A mechanical parking brake locks the rear wheels against rotation and is actuated by a hand lever located at the right rear of the kit. The kit provides the generator set with 8 inches of ground clearance.

4-16. PREVENTIVE MAINTENANCE CHECKS AND SERVICES.

a. General. To insure that the wheel mounting kit is ready for use at all times, it must be systematically inspected in order that defects be discovered and corrected before serious damage or failure of the equipment results. Defects discovered during use shall be noted for correction to be made as soon as use is over. Use of the wheel mounting kit shall be terminated immediately if a defect which could cause damage to the equipment is noted. All defects and short comings shall be recorded, together with the corrective action taken on the applicable forms at the earliest opportunity. Army and Navy users shall accomplish the preventive maintenance checks and services listed and described in subparagraph b. below. Air Force users shall refer to the applicable inspection manuals and work card set in the T.O. 35C2-3 Series for periodic requirements and table 4-5 for detailed procedures. Marine Corps users should refer to the current issue of TM 11275/1.

b. Preventive Maintenance Checks and Services (Army and Navy).

(1) Operator. Table 4-5 contains a tabulated listing of preventive maintenance checks and services which shall be performed before, during, and after operation and the weekly checks and services to be performed by the operator. The item numbers are listed consecutively and indicate the sequence of minimum requirements. Refer to table 4-5 for checks and services.

(2) Organizational Maintenance. Table 4-5 also contains a tabulated listing of preventive maintenance checks and services which shall be performed by organizational maintenance personnel at monthly and semi-annual intervals. The item numbers are listed consecutively and indicate the sequence of minimum requirements. Refer to table 4-5 for checks and services.

4-17. TROUBLE SHOOTING.

Table 4-6 contains a list of malfunctions which is useful in diagnosing and correcting unsatisfactory operation or failure of the wheel mounting kit. Each malfunction is followed by an alphabetical listing of probable causes. The corresponding alphabetical listing of corrective actions contains references to the applicable maintenance paragraph for correcting the malfunction. The table lists only those malfunctions, probable causes and corrective actions within the scope of organizational maintenance. Any malfunction whose causes and corrective actions are beyond the scope of organizational maintenance shall be reported to higher level maintenance.

4-18. OPERATOR'S MAINTENANCE OF WHEEL MOUNTING KIT.

a. Wheels and Tires.

(1) Visually inspect wheels for cracks, dents, corrosion, loose lug nuts, and other damage.

(2) Inspect tires for tread wear, cuts, breaks, blisters and imbedded material.

(3) Check tire pressure with standard tire pressure gauge. Tire pressure shall be 60 psig.

b. Front Axle and Tow Bar Assembly.

(1) Inspection and Repair.

(a) Visually inspect tow bar (28, figure 4-9) for cracks, corrosion, or other damage.

(b) Check tow bar locking mechanism for proper operation.

(c) Inspect safety chains (30) for security of attachment, cracked or broken links or hook, damaged or missing hook latch (25) and corrosion or damage.

(d) Check tie rod assemblies (31) for excessive play.

NOTE

Excessively worn tie rod ends (10 and 16) and king pins (14) may be indicated by excessive and uneven wear on the front tires.

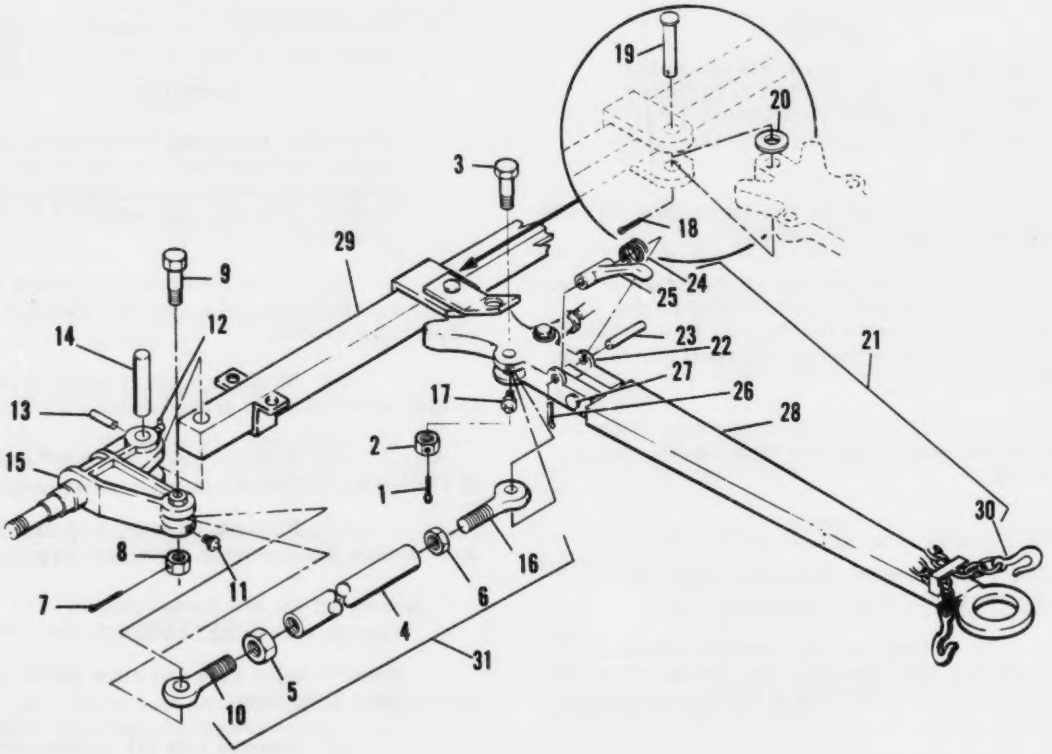
Table 4-5. WHEEL MOUNTING KIT PREVENTIVE MAINTENANCE CHECKS AND SERVICES

ITEM NUMBER	INTERVAL						B - BEFORE OPERATION D - DURING OPERATION A - AFTER OPERATION	DAILY - 8 HRS W - WEEKLY (40 HRS)	M - MONTHLY (100 HRS) S - SEMI-ANNUAL (500 HRS)
	OPERATOR				ORG				
	DAILY								
	B	D	A	W	M	S	ITEM TO BE INSPECTED	PROCEDURE	REFERENCE
1	X				X	X	Tires	Inspect tires. Service tires quarterly.	Para. 4-19
2	X				X		Safety chain	Inspect for secure attachment and condition.	Para. 4-19
3	X				X		Steering linkage	Inspect steering linkage before operation. Lubricate linkage and pivot points monthly.	Para. 4-18
4						X	Wheel bearings	Clean, inspect, and lubricate.	Para. 4-19
5						X	Attaching hardware	Inspect for loose or missing hardware. Tighten any found loose.	Para. 4-19
6					X		Parking brake linkage	Inspect parking brake linkage. Lubricate monthly.	Para. 4-19
7							Brakes	Inspect linings for wear. Adjust brakes.	Para. 4-19

Table 4-6. Wheel Mounting Kit Troubleshooting

MALFUNCTION	PROBABLE CAUSE	CORRECTIVE ACTION
Parking brake will not hold	a. Improperly adjusted or defective brake linkage. b. Improperly adjusted brakes. c. Worn brake linings.	a. Adjust or repair brake linkage (para. 4-19). b. Adjust brakes (para. 4-18, 4-19). c. Replace brake linings and adjust brakes (para. 4-19).
Parking brake will not release	a. Improperly adjusted brake linkage. b. Improperly adjusted brakes.	a. Adjust brake linkage (para. 4-19). b. Adjust brakes (para. 4-19).
Abnormal tire wear	a. Improper tire pressure. b. Loose attaching hardware. c. Wheel wobbles. d. Worn or improperly adjusted tie rods. e. Excessively worn king pins.	a. Correct tire pressure (para. 4-18). b. Tighten attaching hardware. c. See "Wheel wobbles" below. d. Replace worn tie rod ends or adjust tie rods (para. 4-18b.). e. Replace king pins (direct support maintenance).
Wheel wobbles	a. Loose lug nuts. b. Defective wheel bearing or loose hub nut. c. Bent wheel.	a. Tighten lug nuts. b. Inspect wheel bearing. Replace if necessary. Tighten hub nut to obtain proper bearing pressure (para. 4-19). c. Replace wheel (para. 4-18).
Kit pulls to one side or "wanders"	a. Improper tire pressure. b. Wheel brake dragging. c. Loose attaching hardware.	a. Correct tire pressure (para. 4-18). b. Adjust brake (para. 4-19). c. Tighten hardware.

1. Cotter pin
2. Nut
3. Bolt
4. Tube
5. Nut
6. Nut
7. Cotter pin
8. Nut
9. Bolt
10. Tie rod end
11. Grease fitting
12. Grease fitting
13. Roll pin
14. King pin
15. Spindle and knuckle
16. Tie rod end
17. Grease fitting
18. Cotter pin
19. Pin
20. Spacer washer
21. Tow bar assembly
22. Center arm
23. Roll pin
24. Spring
25. Latch
26. Cotter pin
27. Hinge pin
28. Tow bar
29. Front axle
30. Safety chain
31. Tie rod assembly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ME 5-6115-465-12/4-9

Figure 4-9. Wheel Mounting Kit, Front Axle and Tow Bar Assembly, Exploded View

(e) The generator's front end must be raised until the front wheels are clear of the ground in order to check excessive wearing of king pins. (See paragraph 4-19 for jacking procedures.)

NOTE

Care must be exercised when checking excessive wear on king pins to avoid mistaking wheel bearing play or loose wheel for excessively worn king pins.

(f) Replace excessively worn king pins and tie rod ends.

(2) Adjustment. If tie rod ends have been replaced, or adjustment is deemed necessary, adjust the tie rods using the following procedures:

(a) Adjust the tie rod assemblies to as near their original length as possible, with an equal number of threads showing on each tie rod end (10 and 16).

NOTE

With the tow bar aligned with the center line of the generator set, a preliminary check can be made to see if the tie rod assemblies are approximately the right length.

(b) Install the tie rod assemblies (31) with bolts (3 and 9) and nuts (2 and 8).

(c) With the tow bar aligned with the centerline of the generator, and anchored so that it will not move, measure the distance from center to center of the tread of the two front wheels, in front of the wheels.

(d) Measure the distance from center to center of the tread of the two front wheels, behind the wheels.

NOTE

There is no tow in, therefore, these distances should be the same.

(e) If they are not identical, adjust tie rods until they are identical. The distance from the center of the front axle to each wheel must also be the same.

(f) With the wheels on the ground, and tires evenly inflated, a taut string from front to rear of the wheel mounting kit should touch the sidewall of the aft and forward curvation of both front and rear tires simultaneously, as near the hubs as possible.

(3) Lubrication.

(a) Lubricate all grease fittings (11, 12, and 17) on both sides of the wheel mounting kit with grease (GAA).

(b) Lubricate tow bar mechanism and safety chain with an oil can.

c. Rear Axle Assembly.

(1) Visually inspect parking brake handle for insecure mounting, cracks, corrosion, and other damage.

(2) Inspect brake control rods for cracks, corrosion, bends and signs of wear at joints.

(3) Lubricate brake linkage with an oil can.

4-19. ORGANIZATIONAL MAINTENANCE OF WHEEL MOUNTING KIT.

a. Wheels and Tires.

(1) Removal.

WARNING

Set parking brake and block wheels before jacking the generator set. Never perform maintenance on the wheel mounting kit with the generator set supported by the jack alone.

(a) Place a suitable jack under the generator set skid base and raise until wheel is well clear of the ground.

(b) Situate a support which is high enough to keep wheel clear of ground under skid base.

(c) Lower generator set until skid base is resting on support.

(d) Remove lug nuts (1, figure 4-10) and lockwashers (2) to remove wheel and tire.

CAUTION

Remove valve core and allow air to escape from tire.

(e) Remove nuts (4), lockwashers (5) and screws (6) to separate wheel halves (7 and 8) and pneumatic tire (9).

(f) Inspect lug nut studs (3) for crossed, stripped, or peened threads or other damage.

(g) Refer to paragraph b. below and replace any defective studs.

(2) Repair. Refer to Appendix A for listing of applicable manual for pneumatic tire repair.

(3) Installation. Install wheel and tire in reverse order of removal procedures.

b. Wheel Bearings.

(1) Removal.

NOTE

Front wheels are not equipped with brakes.

(a) Remove wheel and tire as outlined in paragraph 4-19(a)(1) above.

(b) Remove grease cap (10, figure 4-9), cotter pin (11) and castellated nut (12) and key washer (13) to remove outer bearing (14).

(c) Remove drum (15) and hub (16) as an assembly with grease seal (17), inner bearing (18) and races (19 and 20). Remove grease seal and inner bearing.

NOTE

Adjust brakes on rear wheels as loose as possible before removing drum and hub assembly.

(d) Do not remove lug nut studs (3) unless replacement is necessary.

(2) Cleaning and Inspection.

(a) Clean bearings, castellated nut, cotter pin, grease cap, axle, and drum and hub assembly with an approved solvent and dry thoroughly.

(b) Visually inspect bearings for corrosion, scored rollers, wear and other damage.

(c) Inspect castellated nut for cracks, corrosion, and stripped or otherwise damaged threads.

(d) Check axle for corrosion, cracks, and stripped or otherwise damaged threads.

(e) Inspect drum and hub assembly for cracks, breaks, corroded or damaged bearing races and other damage.

NOTE

Check rear drum assemblies for deep scores or excessive wear on surface which mates with brake lining.

CAUTION

Do not drive bearing races from drum assembly. Use a puller instead.

(3) Repair. Replace any damaged parts.

NOTE

Bearings and races are matched sets and shall be replaced as such.

(4) Installation.

(a) If bearing races (19 and 20) were removed, press into drum assembly.

(b) Pack inner bearing (18) with grease Automotive and Artillery (GAA).

(c) Install grease seal (17).

CAUTION

On rear wheel, make sure that brake lining and drum assembly are clean and free of grease before installing drum assembly.

(d) Apply light film of grease to axle and install drum and hub assembly (15 and 16).

(e) Pack outer bearing (14) with grease and install.

(f) Install key washer (13) and castellated nut (12).

(g) Tighten nut until snug, then back off until next cutout is aligned with cotter pin hole in axle.

(h) Check that drum assembly rotates freely.

(i) Install cotter pin (11) and grease cap (10).

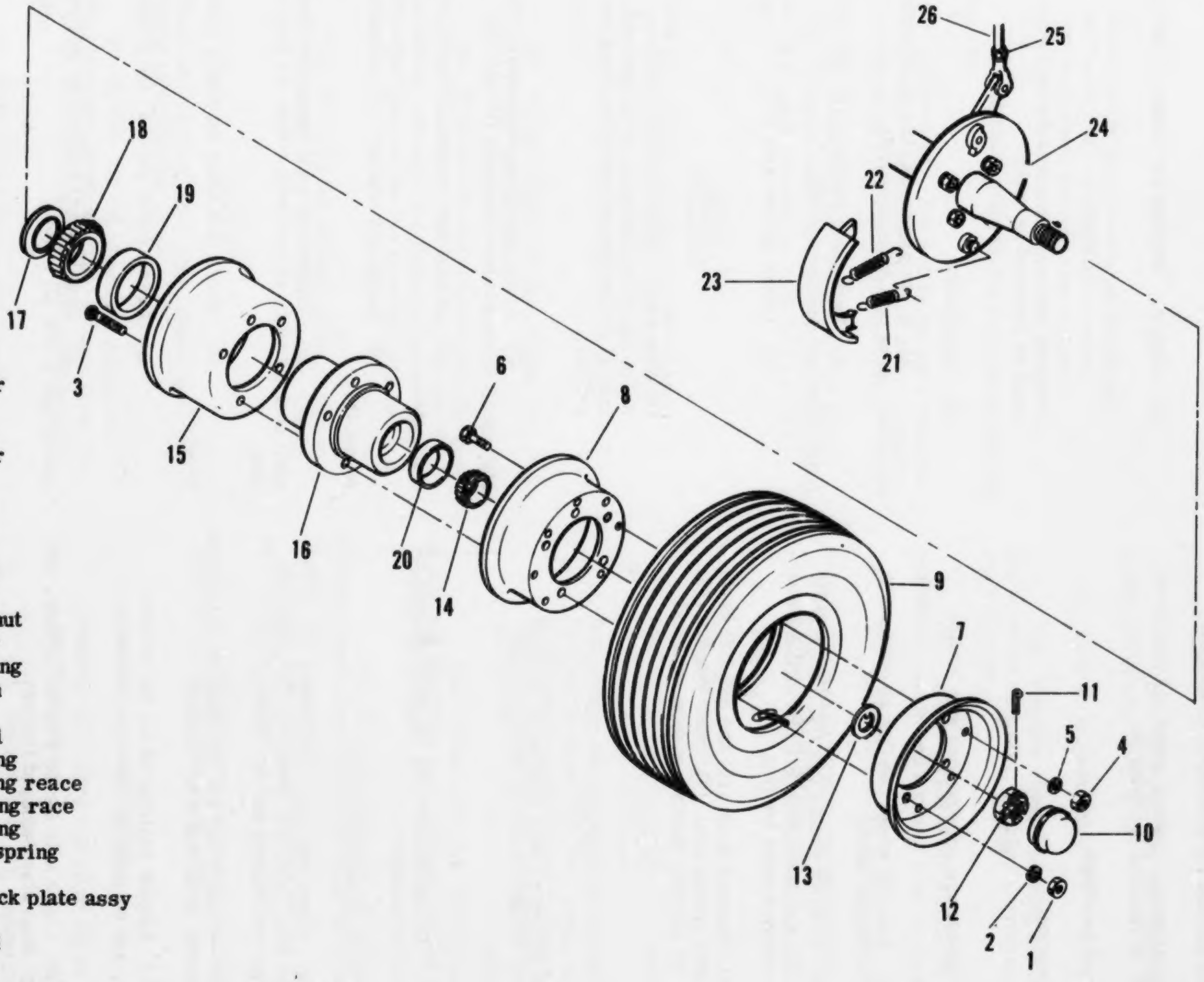
(j) Install wheel and tire as outlined in paragraph 4-19a. (3) above.

NOTE

Adjust brakes on rear wheels as outlined in paragraph 4-19 below before removing supports and jack.

c. Brakes.

(1) Removal.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ME 5-6115-465-12/4-10

1. Nut
2. Lockwasher
3. Stud
4. Nut
5. Lockwasher
6. Screw
7. Wheel half
8. Wheel half
9. Tire
10. Grease cap
11. Cotter pin
12. Catellated nut
13. Key washer
14. Outer bearing
15. Brake drum
16. Hub
17. Grease seal
18. Inner bearing
19. Inner bearing reace
20. Outer bearing race
21. Return spring
22. Hold-down spring
23. Brake shoe
24. Axle and back plate assy
25. Lock nut
26. Linkage rod

Figure 4-10. Wheel Mounting Kit, Wheels and Brakes, Exploded View

(a) Remove wheel and tire with drum assembly as outlined in paragraph 4-19b. (1) above.

(b) Remove return springs (21, figure 4-10).

(c) Remove hold-down springs (22) and brake shoes (23) from axle and plate assembly (24).

(2) Cleaning and Inspection.

(a) Clean brake shoes with filtered compressed air.

(b) Clean remaining parts with dry cleaning solvent (Federal Specification P-D-680) and dry thoroughly.

(c) Inspect brake shoe linings for wear. If lining is 1/16 inch or less, brake shoes shall be replaced.

(d) Inspect return springs for cracks, corrosion and distortion.

(e) Check spring clip for cracks, corrosion, and other damage.

(f) Check adjustment bolts and abutment pins for cracks, corrosion, stripped or otherwise damaged threads and other damage.

(g) Check control lever and wedge for cracks, breaks, corrosion, and other damage.

(h) Inspect backing plate for cracks, corrosion, warping, missing or deteriorated dust covers and other damage.

(3) Repair. Replace any parts found defective.

(4) Installation.

(a) Install brake shoes in reverse order of removal procedures.

CAUTION

Make sure that drum assembly and brake shoe linings are clean and free of grease before installing drum assembly.

(b) Install drum assembly with wheel and tire attached as outlined in paragraph 4-19b. (4) above.

NOTE

Clean and inspect wheel bearings as outlined in paragraph 4-19b. (2) above before installing drum assembly.

(5) Adjustment.

(a) Rotate adjustment knob on brake control lever to provide minimum movement of brake linkage.

NOTE

Rotating adjustment knob clockwise increases brake linkage movement. Rotating adjustment knob counterclockwise decreases linkage movement.

(b) Loosen lock nuts (25, figure 4-10) on both wheels and rotate rod (26) until both brake shoes lightly rub drums. Tighten lock nuts (25).

(c) Actuate brake control lever to ascertain that brakes function properly. Additional adjustment is provided by adjustment knob on brake control lever.

Section V. LOAD BANK KIT

4-20. GENERAL.

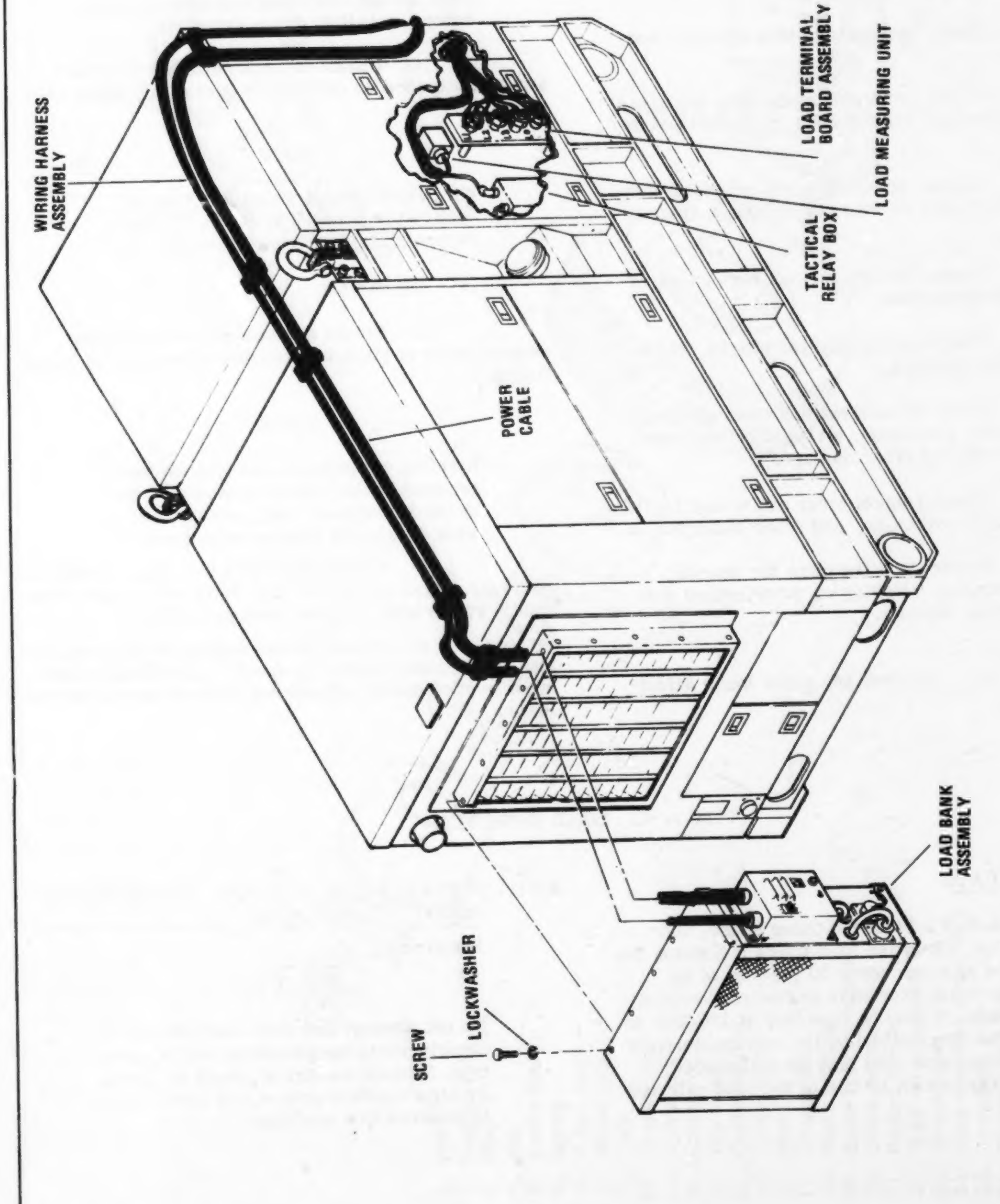
The load bank is a balanced three phase, four wire, air cooled, resistive load which maintains the generator up to approximately 50 percent of its rated load to prevent excessive engine carbonizing due to light loads. It may be operated at 120/208 or 240/416 volts as determined by the voltage selector connectors. Generator load may be selected in 12.5 percent increments by use of the load selector switch.

4-21. INSTALLATION, TESTING, AND REPLACEMENT OF LOAD BANK.

a. Installation.

WARNING

Do not attempt to install load bank assembly while the generator set is operating. Serious electrical shock or death by electrocution may result from failure to observe this warning.


WIRING HARNESS ASSEMBLY
LOAD TERMINAL BOARD ASSEMBLY
LOAD MEASURING UNIT
TACTICAL RELAY BOX
POWER CABLE
LOAD BANK ASSEMBLY
LOCKWASHER
SCREW

ME 5-6115-465-12/4-11

Figure 4-11. Load Bank Installation

(1) Install load bank assembly (figure 4-11) onto generator set radiator grille and secure with screws and lockwashers.

(2) Connect wiring harness leads to load terminal board assembly load measuring unit and tactical relay assembly (see figure 4-13).

b. Testing. Refer to paragraph 2-25 and operate the load bank to see if it is functional.

c. Replacement.

(1) Removal.

WARNING

Do not attempt to remove load bank while generator set is operating. Serious electrical shock or death by electrocution may result from failure to observe this warning.

(a) Disconnect load bank wiring harness from generator set load terminal board load measuring unit and tactical relay assembly.

(b) Remove screws (figure 4-11) and lockwashers to remove load bank assembly.

(2) Installation. Install load bank as outlined in paragraph 4-21a. above.

4-22. PREVENTIVE MAINTENANCE CHECKS AND SERVICES.

a. General. To insure that the load bank is ready for operation at all times, it must be systematically inspected in order that defects be discovered and corrected before serious damage or failure of the equipment results. Defects discovered during operation shall be noted for correction to be made as soon as operation has ceased. Operation shall be terminated immediately if a defect which could cause damage to the equipment is noted. All defects and short comings shall be recorded, together with the corrective action taken, on the applicable forms at the earliest opportunity. Army and Navy users shall accomplish the preventive maintenance checks and services listed and described in subparagraph b. below. Air Force users shall refer to the applicable inspection manuals and work card set in the T.O. 35C2-3 Series for periodic requirements and table 4-7 for detailed procedures. Marine Corps users shall refer to the current issue of TM 11275/1.

b. Preventive Maintenance Checks and Services (Army and Navy).

(1) Operator. Table 4-7 contains a tabulated listing of preventive maintenance checks and services which shall be performed before, during, and after operation and the weekly checks and services to be performed by the operator. The item numbers are listed consecutively and indicate the sequence of minimum requirements. Refer to table 4-7 for checks and services.

(2) Organizational Maintenance. Table 4-7 also contains a tabulated listing of preventive maintenance checks and services which shall be performed by organizational maintenance personnel at monthly and semi-annual intervals. The item numbers are listed consecutively and indicate the sequence of minimum requirements. Refer to table 4-7 for checks and services.

4-23. TROUBLE SHOOTING.

Table 4-8 contains a list of malfunctions which are useful in diagnosing and correcting unsatisfactory operation or failure of the load bank. Each malfunction is followed by an alphabetical listing of probable causes. The corresponding alphabetical listing of corrective actions contain references to the applicable maintenance paragraphs for correcting the malfunction. The table lists only those malfunctions whose causes and corrective actions are within the scope of organizational maintenance. Any malfunction whose corrective action is beyond the scope of organizational maintenance shall be reported to higher level maintenance.

4-24. OPERATOR MAINTENANCE INSPECTION OF LOAD BANK.

a. Visually inspect wiring harness assembly (figure 4-11) for frayed or burned insulation, loose support clamps and connections or other damage.

b. Visually inspect voltage selector connectors (3, figure 4-12) and load selector switch (13, figure 4-12) for freedom of movement between positions, insecure mounting, loose connections, loose or broken control knobs and other damage.

4-25. ORGANIZATIONAL MAINTENANCE OF LOAD BANK.

a. Transformers. Visually inspect transformers for corrosion, frayed wires, signs of overheating, discoloration, and other damage.

b. Voltage Selector Connectors.

(1) Removal.

(a) Refer to paragraph 4-21c. (1) above and remove load bank assembly from generator set.

(b) Remove nuts (1, figure 4-12) and screws (2) and pull voltage selector connectors (3) out from load bank.

(c) Tag electrical leads and unsolder connections to connector.

(d) Do not remove screw and captive washer assembly (4) and protective cap (5) unless inspection reveals damage.

Table 4-7. LOAD BANK PREVENTIVE MAINTENANCE CHECKS AND SERVICES

ITEM NUMBER	INTERVAL						B - BEFORE OPERATION D - DURING OPERATION A - AFTER OPERATION	DAILY - 8 HRS W - WEEKLY (40 HRS)	M - MONTHLY (100 HRS) S - SEMI-ANNUAL (500 HRS)
	OPERATOR				ORG				
	DAILY								
	B	D	A	W	M	S	ITEM TO BE INSPECTED	PROCEDURE	REFERENCE
1	X						Guard	Inspect for foreign materials.	Figure 4-8
2						X	Mounting hardware	Inspect for loose mounting hardware.	Para. 4-24
3	X			X		X	Control panel assembly	Inspect for damage.	Para. 4-24
4						X	Wiring harness	Check for damage or evidence of shorting.	Para. 4-24
5						X	Heater element	Visually inspect for damage and signs of overheating or shorting.	Para. 4-24

Table 4-8. Load Bank Trouble Shooting

MALFUNCTION	PROBABLE CAUSE	CORRECTIVE ACTION
Load bank does not apply load to generator	a. Defective load selector switch. b. Defective wiring.	a. Replace switch (para. 4-25). b. Repair or replace wiring (para. 4-25).
Indicator light does not illuminate when load bank is in operation.	a. Defective lamp. b. Defective wiring.	a. Replace lamp (para. 4-25). b. Replace or repair wiring (para. 4-25).

(2) Cleaning and Inspection.

(a) Clean voltage selector connectors with filtered compressed air and a soft bristle brush or wipe with a clean, lint-free cloth lightly moistened with an approved solvent.

(b) Visually inspect connectors for cracks, corrosion, stripped or damaged threads and other damage.

(3) Installation. Install voltage selector connectors in reverse order of removal procedures.

c. Load Selector Switch.

(1) Removal.

(a) Remove screws (6, figure 4-12) and lockwashers (7) and pull control box cover (8) away from load bank.

(b) Tag and disconnect electrical leads to load selector switch.

(c) Remove setscrew (9) and control knob (10).

(d) Remove screws (11) to remove load selector plate (12) and switch (13).

(2) Cleaning and Inspection.

(a) Clean switch with filtered compressed air and a soft bristle brush or wipe with a clean, lint-free cloth lightly moistened with an approved solvent.

(b) Visually inspect switch for cracks, corrosion, stripped, or damaged threads and other damage.

(3) Testing.

(a) Rotate switch to the OFF position.

(b) Using an ohmmeter or similar device, check for continuity using figure 4-13 as a guide.

(c) Replace switch if it fails to meet continuity requirements.

(4) Installation. Install load selector switch in reverse order of removal procedures.

d. Circuit Breaker.

(1) Removal.

(a) Remove control box cover as outlined in subparagraph c. (1)(a) above.

(b) Tag and disconnect electrical leads to circuit breaker.

(c) Remove screws (14, figure 4-12) to remove cover (15) and circuit breaker (16).

(2) Cleaning and Inspection.

(a) Clean circuit breakers with filtered compressed air and a soft bristle brush or wipe with a clean, lint-free cloth lightly moistened with an approved solvent.

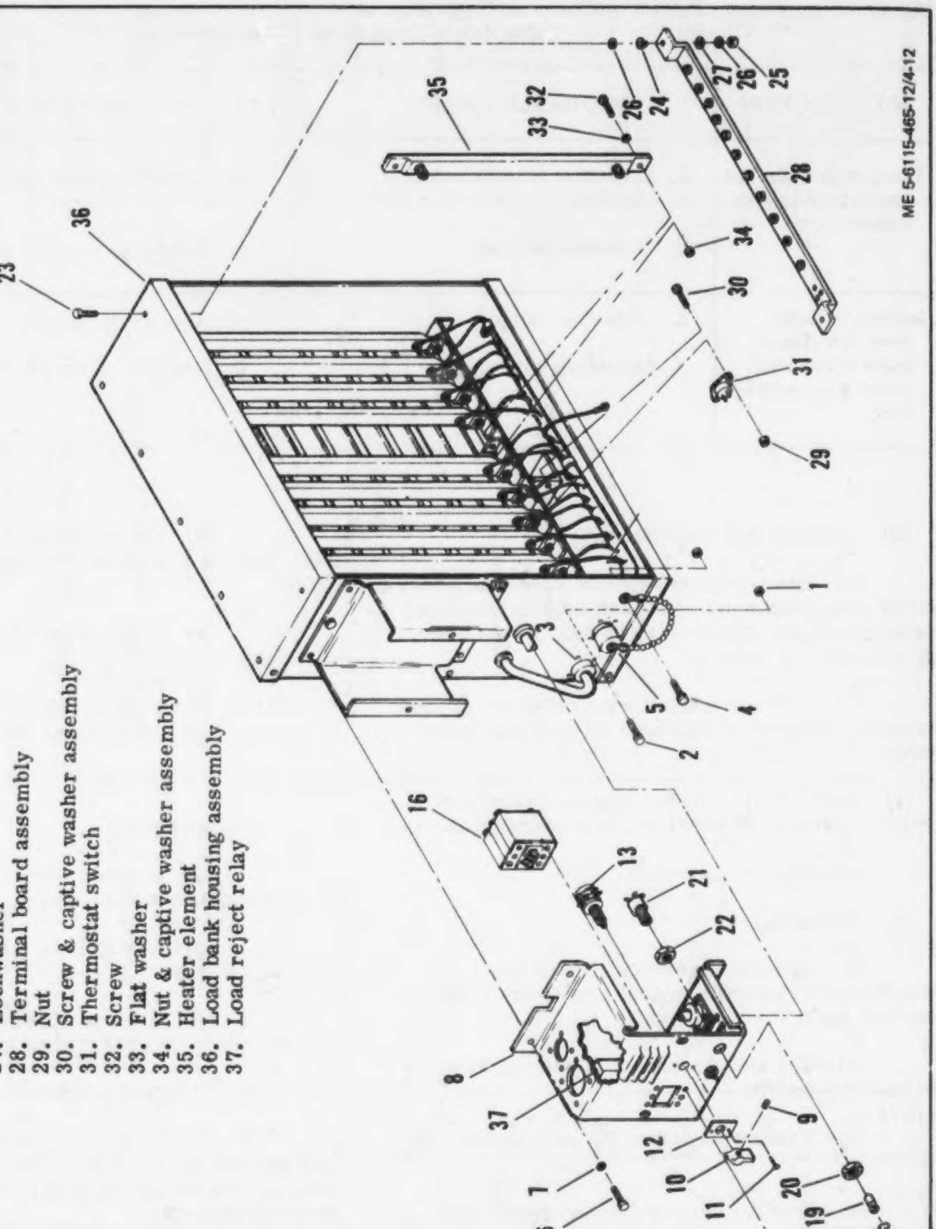
(b) Visually inspect circuit breakers for cracks, corrosion, stripped, or damaged threads and evidence of shorting or other damage.

(3) Testing.

(a) Place circuit breaker in OPEN position.

(b) Using an ohmmeter or similiar device, check for open circuit between terminals using figure 4-13 as a guide.

(c) Place circuit breaker in CLOSED position and check for continuity between terminals.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37
ME 5-6115-465-12/4-12

1. Nut
2. Screw
3. Voltage selector connector
4. Screw & captive washer assembly
5. Protective cap
6. Screw
7. Lockwasher
8. Control box cover
9. Setscrew
10. Control knob
11. Screw
12. Load selector plate
13. Load selector switch
14. Screw
15. Cover
16. Circuit breaker
17. Lens
18. O-ring
19. Lamp
20. Nut
21. Base
22. Nut
23. Screw
24. Plastic washer
25. Nut
26. Flat washer
27. Lockwasher
28. Terminal board assembly
29. Nut
30. Screw & captive washer assembly
31. Thermostat switch
32. Screw
33. Flat washer
34. Nut & captive washer assembly
35. Heater element
36. Load bank housing assembly
37. Load reject relay

Figure 4-12. Load Bank Assembly, Exploded View

Figure 4-12. Load Bank Assembly, Exploded View

(d) Replace circuit breaker if it fails to meet the above continuity requirements.

(4) Installation. Install circuit breaker in reverse order of removal procedures.

e. Indicator Light.

(1) Removal.

(a) Remove control box cover as outlined in subparagraph c. (1)(a) above.

(b) Tag and disconnect electrical leads to indicator light.

(c) Unscrew lens (17) and remove o-ring (18) and lamp (19).

(d) Remove nut (20) to remove base (21) and nut (22).

(2) Cleaning and Inspection.

(a) Clean indicator light with filtered compressed air and a soft bristle brush or wipe with a clean, lint-free cloth lightly moistened with an approved solvent.

(b) Visually inspect light for cracks, corrosion, cracked or broken lens, stripped or damaged threads, burns and other damage.

(c) Check lamp for burned out filament.

(d) Replace only parts found damaged.

(3) Installation. Install indicator light in reverse order of removal procedures.

f. Terminal Board Assembly.

(1) Removal.

(a) Remove load bank assembly as outlined in paragraph 4-21c. (1) above.

(b) Tag and disconnect electrical leads to terminal board assembly.

(c) Remove screws (23, figure 4-12), plastic washers (24), nuts (25), flat washers (26) and washers (27) to remove terminal board assembly (28).

(2) Cleaning and Inspection.

(a) Clean terminal board with filtered compressed air and a soft bristle brush or wipe with a clean, lint-free cloth lightly moistened with an approved solvent.

(b) Visually inspect terminal board for cracks, corrosion, burns and stripped or damaged threads.

(c) Replace terminal board if damaged beyond simple repair.

(3) Installation. Install terminal board assembly in reverse order of removal procedures.

g. Thermostat switch.

(1) Removal.

(a) Remove load bank assembly as outlined in paragraph 4-21c. (1) above.

(b) Tag and disconnect electrical connections to thermostat switch.

(c) Remove nuts (29, figure 4-12) and screw and captive washer assemblies (30) to remove thermostat switch (31).

(2) Cleaning and Inspection.

(a) Clean thermostat by flushing with an approved solvent and drying thoroughly with filtered compressed air.

(b) Visually inspect thermostat for cracks, corrosion, stripped or damaged threads, and other obvious damage.

(c) Replace thermostat if damage is found.

(3) Installation. Install thermostat in reverse order of removal procedures.

h. Heater Element.

(1) Removal.

(a) Remove load bank assembly as outlined in paragraph 4-21c. (1) above.

(b) Tag and disconnect electrical leads to heater elements.

(c) Remove screws (32, figure 4-12), flat washers (33) and nut and captive washer assemblies (34) to remove heater elements (35) from housing (36).

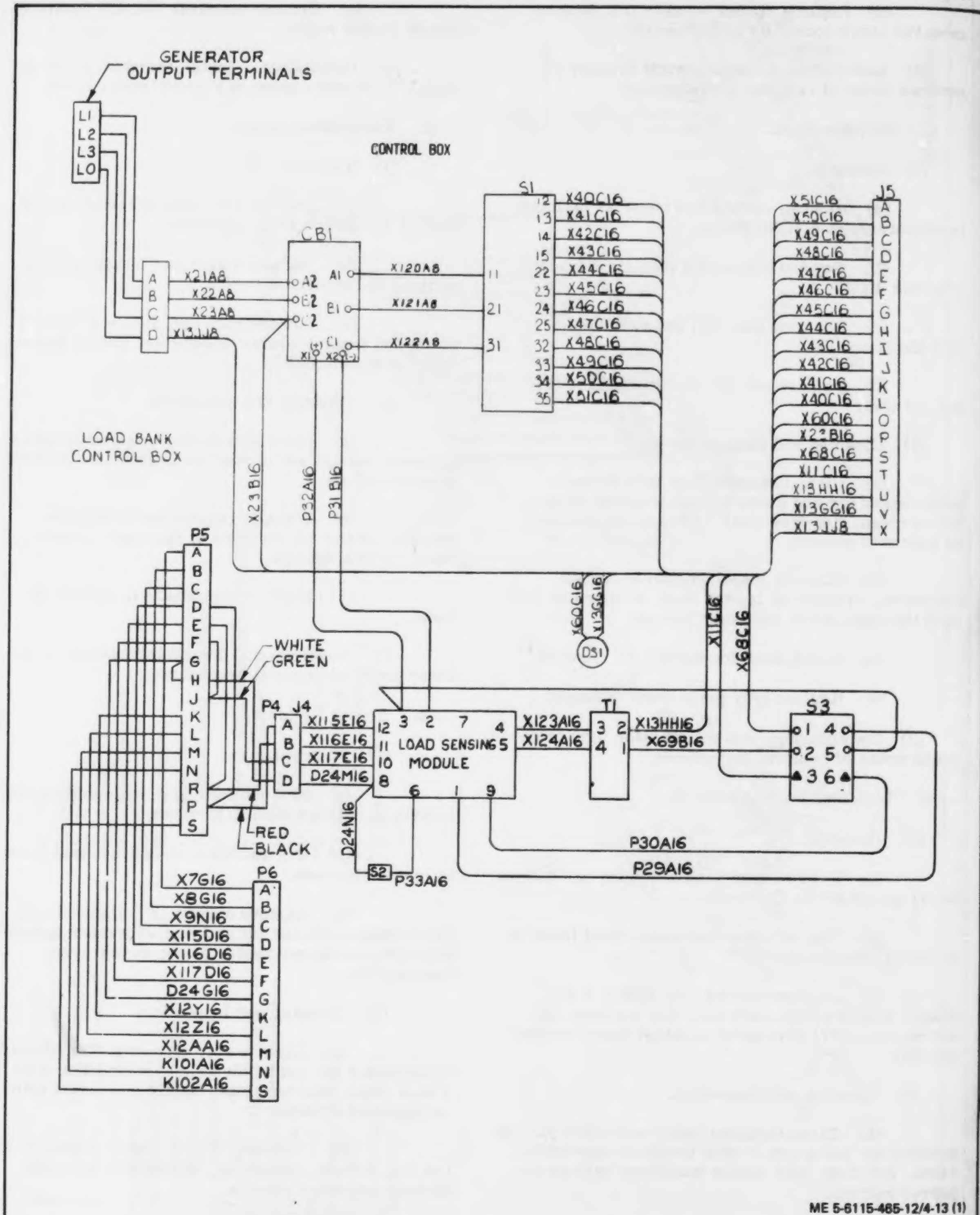
(2) Cleaning and Inspection.

(a) Clean heater elements with filtered compressed air and an electrician's brush or wipe with a clean, lint-free cloth lightly moistened with an approved solvent.

(b) Visually inspect heater elements for cracks, breaks, corrosion, stripped or damaged threads and other damage.

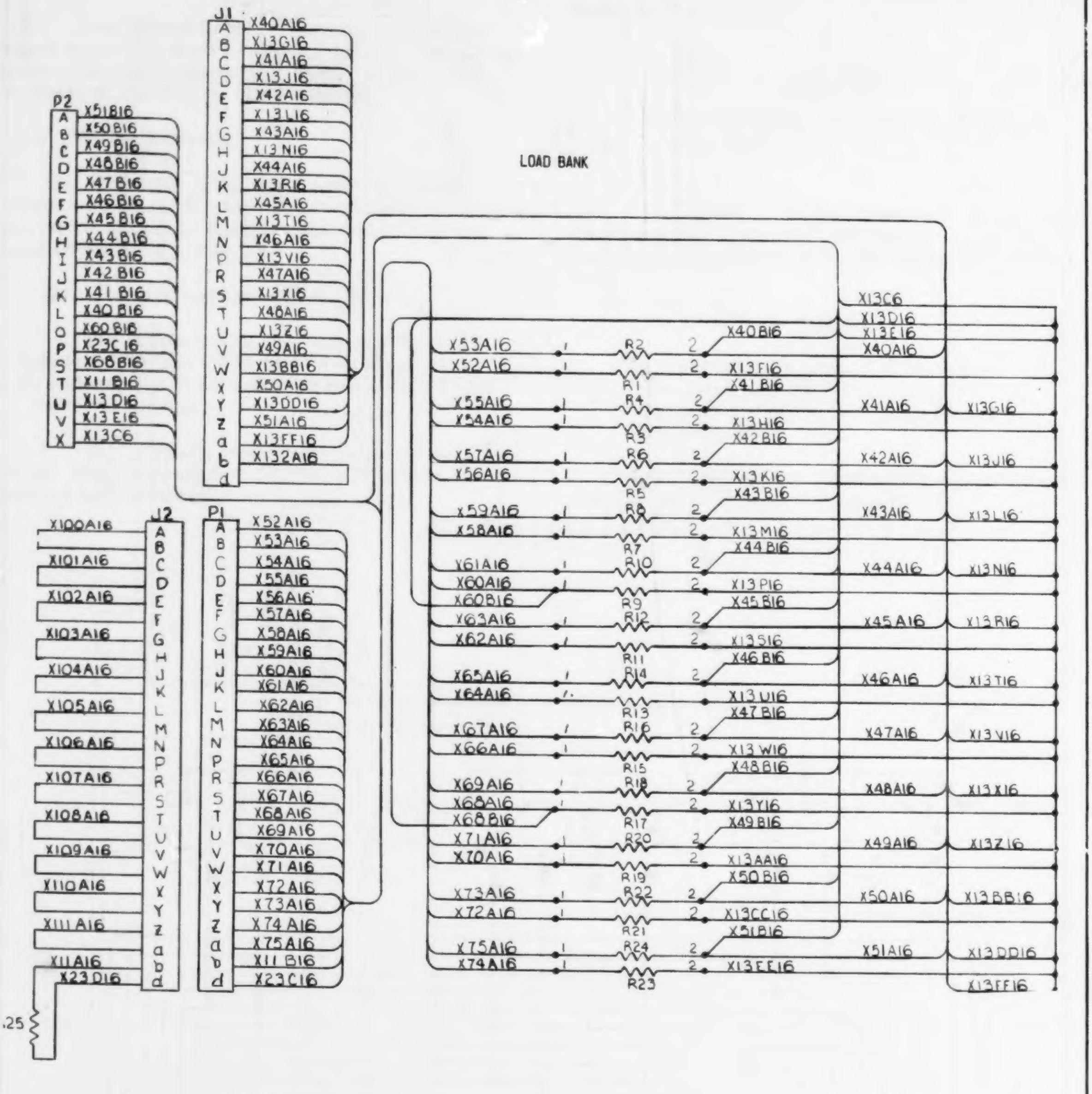
(3) Testing.

(a) Using an ohmmeter, check resistance between terminals of heating elements. Resistance shall be approximately 37 ohms.


GENERATOR OUTPUT TERMINALS
L1
L2
L3
LO
CONTROL BOX
LOAD BANK CONTROL BOX
A
B
C
D
X21A8
X22A8
X23A8
X13JJ8
CB1
A2
B2
C2
A1
B1
C1
X1 (+)
X29 (-)
X120A8
X121A8
X122A8
S1
11
21
31
12 X40C16
13 X41C16
14 X42C16
15 X43C16
22 X44C16
23 X45C16
24 X46C16
25 X47C16
32 X48C16
33 X49C16
34 X50C16
35 X51C16
J5
X51C16 A
X50C16 B
X49C16 C
X48C16 D
X47C16 E
X46C16 F
X45C16 G
X44C16 H
X43C16 I
X42C16 J
X41C16 K
X40C16 L
X60C16 O
X23B16 P
X68C16 S
X11C16 T
X13HH16 U
X13GG16 V
X13JJ8 X
X23B16
P32A16
P31B16
X60C16
X13GG16
DS1
X11C16
X68C16
P5
A
B
C
D
E
F
G
H
J
K
L
M
N
R
P
S
WHITE
GREEN
RED
BLACK
P4 J4
A X115E16
B X116E16
C X117E16
D D24M16
12
11
10
8
3 2 7
4
5
6
1
9
LOAD SENSING MODULE
X123A16
X124A16
T1
3 2
4 1
X13HH16
X69B16
S3
1 4
2 5
3 6
P30A16
P29A16
D24N16
S2
P33A16
P6
X7G16 A
X8G16 B
X9N16 C
X115D16 D
X116D16 E
X117D16 F
D24G16 G
X12Y16 K
X12Z16 L
X12AA16 M
K101A16 N
K102A16 S

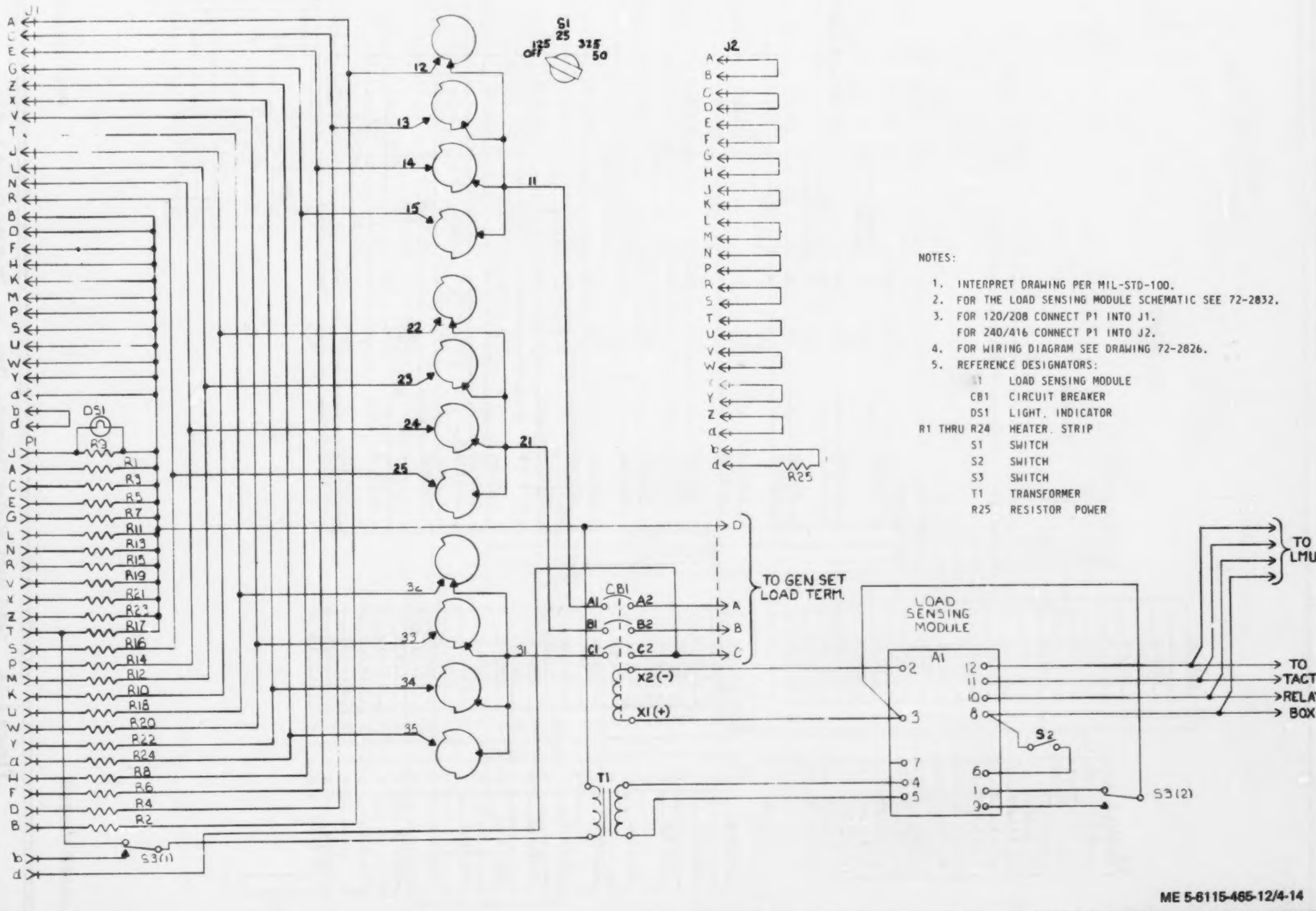
ME 5-6115-465-12/4-13 (1)

Figure 4-13. Load Bank Wiring Diagram, Dwg. No. 72-2826 (Sheet 1 of 2)


LOAD BANK
J1
A X40A16
B X13G16
C X41A16
D X13J16
E X42A16
F X13L16
G X43A16
H X13N16
J X44A16
K X13R16
L X45A16
M X13T16
N X46A16
P X13V16
R X47A16
S X13X16
T X48A16
U X13Z16
V X49A16
W X13BB16
X X50A16
Y X13DD16
Z X51A16
a X13FF16
b X132A16
d
P2
A X51B16
B X50B16
C X49B16
D X48B16
E X47B16
F X46B16
G X45B16
H X44B16
I X43B16
J X42B16
K X41B16
L X40B16
O X60B16
P X23C16
S X68B16
T X11B16
U X13D16
V X13E16
X X13C6
J2
A X100A16
C X101A16
E X102A16
G X103A16
J X104A16
L X105A16
N X106A16
R X107A16
T X108A16
V X109A16
X X110A16
Z X111A16
b X11A16
d X23D16
.25
P1
A X52A16
B X53A16
C X54A16
D X55A16
E X56A16
F X57A16
G X58A16
H X59A16
J X60A16
K X61A16
L X62A16
M X63A16
N X64A16
P X65A16
R X66A16
S X67A16
T X68A16
U X69A16
V X70A16
W X71A16
X X72A16
Y X73A16
Z X74A16
a X75A16
b X11B16
d X23C16
X53A16 1 R2 2 X40B16
X52A16 1 R1 2 X13F16
X55A16 1 R4 2 X41B16
X54A16 1 R3 2 X13H16
X57A16 1 R6 2 X42B16
X56A16 1 R5 2 X13K16
X59A16 1 R8 2 X43B16
X58A16 1 R7 2 X13M16
X61A16 1 R10 2 X44B16
X60A16 1 R9 2 X13P16
X60B16
X63A16 1 R12 2 X45B16
X62A16 1 R11 2 X13S16
X65A16 1 R14 2 X46B16
X64A16 1 R13 2 X13U16
X67A16 1 R16 2 X47B16
X66A16 1 R15 2 X13W16
X69A16 1 R18 2 X48B16
X68A16 1 R17 2 X13Y16
X68B16
X71A16 1 R20 2 X49B16
X70A16 1 R19 2 X13AA16
X73A16 1 R22 2 X50B16
X72A16 1 R21 2 X13CC16
X75A16 1 R24 2 X51B16
X74A16 1 R23 2 X13EE16
X13C6
X13D16
X13E16
X40A16
X41A16 X13G16
X42A16 X13J16
X43A16 X13L16
X44A16 X13N16
X45A16 X13R16
X46A16 X13T16
X47A16 X13V16
X48A16 X13X16
X49A16 X13Z16
X50A16 X13BB16
X51A16 X13DD16
X13FF16

ME 5-6115-465-12/4-13 (2)

Figure 4-13. Load Bank Wiring Diagram, Dwg. No. 72-2826 (Sheet 2 of 2)


J1
A C E G Z X V T J L N R B D F H K M P S U W Y a b d
P1
J A C E G L N R V X Z T S P M K U W Y a H F D B b d
DS1
R3
R1 R9 R5 R7 R11 R13 R15 R19 R21 R23 R17 R16 R14 R12 R10 R18 R20 R22 R24 R8 R6 R4 R2
S3(1)
12 13 14 15
11
22 23 24 25
21
32 33 34 35
31
S1
OFF 125 25 325 50
J2
A B C D E F G H J K L M N P R S T U V W X Y Z a b d
R25
CB1
A1 A2
B1 B2
C1 C2
D A B C
TO GEN SET LOAD TERM.
X2 (-)
X1 (+)
T1
LOAD SENSING MODULE
A1
2 3 7 4 5
12 11 10 8 6 1 9
S2
S3(2)
TO LMU
TO TACT RELAY BOX

NOTES:

1. INTERPRET DRAWING PER MIL-STD-100.
2. FOR THE LOAD SENSING MODULE SCHEMATIC SEE 72-2832.
3. FOR 120/208 CONNECT P1 INTO J1.
   FOR 240/416 CONNECT P1 INTO J2.
4. FOR WIRING DIAGRAM SEE DRAWING 72-2826.
5. REFERENCE DESIGNATORS:

A1	LOAD SENSING MODULE
CB1	CIRCUIT BREAKER
DS1	LIGHT, INDICATOR
R1 THRU R24	HEATER, STRIP
S1	SWITCH
S2	SWITCH
S3	SWITCH
T1	TRANSFORMER
R25	RESISTOR POWER

ME 5-6115-465-12/4-14

Figure 4-14. Load Bank Schematic Diagram, Dwg. No. 72-2827

(b) Replace any heater element which does not test correctly.

(4) Installation. Install heater element in reverse order of removal procedures.

i. Load Reject Relay. Visually inspect load reject relay (37, figure 4-12) for insecure mounting, loose electrical connections, dents, cracks, and evidence of shorting or other damage.

j. Wiring Harness.

(1) Removal. Tag and disconnect wiring harness wires, connectors, and terminals as required for access to other components or replacement of damaged parts.

(2) Cleaning and Inspection.

(a) Clean wiring harness with filtered compressed air and a soft bristle brush or wipe with a clean, lint-free cloth lightly moistened with an approved solvent.

(b) Visually inspect wiring harness for burns, bent, corroded or otherwise damaged connectors and terminals.

(c) Check insulation for burns, chafing, and deterioration.

(3) Testing. Check continuity of individual wires with a multimeter or continuity light using figure 4-13 as a guide.

CAUTION

Do not use acid core solder on electrical components.

(4) Repair. Replace damaged wires, terminals, and connectors by unsoldering connections, installing replacement parts and soldering connections.

NOTE

If more than 30 percent of the wires are damaged, replace the wiring harness and forward it to higher level for rebuilding.

(5) Installation. Install wiring harness in reverse order of removal procedures.

APPENDIX A

REFERENCES

This Appendix contains a list of reference manuals that may be used in conjunction with this TM in the operation and maintenance of the 30 KW DOD Generator Set. Those manuals not coded are applicable for use by all services. The manuals are coded (A) for Army use, (F) Air Force use, (N) Navy use, and (M) Marine Corps use.

1. FIRE PROTECTION

TB 5-4200-200-10 (A)	Hand Portable Fire Extinguishers Approved for Army Use

2. LUBRICATION

C9100-IL	Petroleum, Petroleum Base Products and Related Materials
C6800-IL	Chemicals and Chemical Products
LO 5-6115-465-12 (A) LO 06858B/06859D-12 (M)	Lubrication Order

3. PAINTING

T.O. 35-1-3 (F)	Painting and Marking of USAF Aerospace Ground Equipment
TM 9-213 (A)	Painting Instructions for Field Use

4. RADIO SUPPRESSION

TM 11-483 (A)	Radio Interference Suppression
T.O. 31-1-141-13 (F)	Basic Electronics Technology

5. MAINTENANCE

TM 38-750 (A)	The Army Maintenance Management System
TM 9-6140-200-14 (A) T.O. 36Y-4-1-194 (F)	Maintenance of Storage Batteries; Lead Acid Type
T.O. 00-25-225 (F)	Repair of External Power Cables, Aerospace Ground Equipment
T.O. 00-25-234 (F)	General Shop Practice Requirements for the Repair, Maintenance, and Test of Electronic Equipment
NAVWEPS 01-1A-505 (N) T.O. 1-1A-14 (F) TM 55-1500-323-25 (A)	Installation Practices for Aircraft Electric and Electronic Wiring
T.O. 35-1-11 (F)	Organizational, Intermediate and Depot Level Maintenance for FSC 6115 Non-Airborne Equipment
T.O. 35-1-12 (F)	Compounds and Procedures for Cleaning Aerospace Ground Equipment
T.O. 35-1-26 (F)	Repair/Replacement Criteria for FSC 6115 Aerospace Ground Equipment
T.O. 35-1-524 (F)	USAF Equipment Registration Number System Applicable to FSC 6115 Equipment

5. MAINTENANCE (Continued)

T.O. 36-1-7	Operation in Cold Weather Areas
T.O. 36Y32-1-142 (F) TM 9-2610-200-20 (A)	Organizational Care, Maintenance and Repair of Pneumatic Tires and Inner Tubes
TM 5-6115-465-24P (A) T.O. 35C2-3-446-4 (F) NAVFAC P-8-625-24P (N) SL 4-06858B/06859D (M)	Organizational, Intermediate (Field) (Direct Support and General Support) and Depot Maintenance Repair Parts and Special Tools List
TM 5-6115-465-34 (A) T.O. 35C2-3-446-2 (F) NAVFAC -P-8-625-34 (N) TM 06858B/06859D-34 (M)	Intermediate (Field) (Direct and General Support) and Depot Level Maintenance Manual
TB 750-651 (A)	Use of Anti-freeze Solutions and Cleaning Compounds in Engine Cooling Systems
TM 5-6115-588-14 (A) T.O. 35CA-1-111 (F) NAVFAC P-8-601 (N) TM 6115-15/4 (M)	Maintenance Manual Including Repair Parts and Special Tools List for Auxiliary Equipment 15 through 200 KW, DOD Family Generator Sets

6. SHIPMENT AND STORAGE

TM 38-230 (A)	Preservation, Packaging and Packing of Military Supplies and Equipment
TB 740-97-2 (A)	Preservation of TROSCOM Mechanical Equipment for Shipment and Storage
TM 740-90-1 (A)	Administrative Storage of Equipment
T.O. 35-1-4 (F)	Processing and Inspection of Aerospace Ground Equipment for Storage and Shipment
T.O. 38-1-5 (F)	Processing and Inspection of Non-Mounted, Non-Aircraft Gasoline and Diesel Engines for Storage and Shipment

7. DESTRUCTION TO PREVENT ENEMY USE

TM 750-244-3 (A)	Procedures for Destruction of Equipment to Prevent Enemy Use

APPENDIX B
COMPONENTS OF END ITEM LIST

All data is deleted on pages B-1 and B-2.

APPENDIX C

MAINTENANCE ALLOCATION CHART (ARMY ONLY)

Section I. INTRODUCTION

C-1. GENERAL.

a. This section provides a general explanation of all maintenance and repair functions authorized at various maintenance levels.

b. Section II designates overall responsibility for the performance of maintenance functions on the identified end item or component. The implementation of the maintenance functions upon the end item or component will be consistent with the assigned maintenance functions.

c. Section III lists the special tools and test equipment required for each maintenance function as referenced from Section II.

d. Section IV contains supplemental instructions, explanatory notes and/or illustrations required for a particular maintenance function.

C-2. EXPLANATION OF COLUMNS IN SECTION II.

a. Group Number, Column 1. The assembly group is a numerical group assigned to each assembly in a top down breakdown sequence. The applicable assembly groups are listed on the MAC in disassembly sequence beginning with the first assembly removed in a top down disassembly sequence.

b. Assembly Group, Column 2. This column contains a brief description of the components of each assembly group.

c. Maintenance Functions, Column 3. This column lists the various maintenance functions (A through K) and indicates the lowest maintenance category authorized to perform these functions. The symbol designations for the various maintenance categories are as follows:

C - Operator, Crew
O - Organizational maintenance
F - Direct support maintenance
H - General support maintenance
D - Depot maintenance

The maintenance functions are defined as follows:

A - INSPECT. To determine serviceability of an item by comparing its physical, mechanical, and electrical characteristics with established standards.

B - TEST. To verify serviceability and to detect electrical or mechanical failure by use of test equipment.

C - SERVICE. To clean, to preserve, to charge, and to add fuel, lubricants, cooling agents, and air. If it is desired that elements, such as painting and lubricating, be defined separately, they may be so listed.

D - ADJUST. To rectify to the extent necessary to bring into proper operating range.

E - ALIGN. To adjust specified variable elements of an item to bring to optimum performance.

F - CALIBRATE. To determine the corrections to be made in the readings of instruments or test equipment used in precise measurement. Consists of the comparison of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of this instrument being compared with the certified standard.

G - INSTALL. To set up for use in an operational environment such as an emplacement, site, or vehicle.

H - REPLACE. To replace unserviceable items with serviceable like items.

I - REPAIR. Those maintenance operations necessary to restore an item to serviceable condition through correction of material damage or a specific failure. Repair may be accomplished at each category of maintenance.

J - OVERHAUL. Normally, the highest degree of maintenance performed by the Army in order to minimize time work in process is consistent with quality and economy of operation. It consists of that maintenance necessary to restore an item to completely serviceable condition as prescribed by maintenance standards in technical publications for each item of equipment. Overhaul normally does not return an item to like new, zero mileage, or zero hour condition.

K - REBUILD. The highest degree of material maintenance. It consists of restoring equipment as nearly as possible to new condition in accordance with original manufacturing standards. Rebuild is performed only when required by operational considerations or other paramount factors and then only at the depot maintenance category. Rebuild reduces to zero the hours or miles the equipment, or component thereof, has been in use.

L - SYMBOLS. The uppercase letter placed in the appropriate column indicates the lowest level at which that particular maintenance function is to be performed.

d. Tools and Equipment, Column 4. This column is provided for referencing by code the special tools and test equipment, (Section III), required to perform the maintenance functions (Section II).

e. Remarks, Column 5. This column is provided for referencing by code the remarks (Section IV) pertinent to the maintenance functions.

C-3. EXPLANATION OF COLUMNS IN SECTION III.

a. Reference Code. This column consists of a number and a letter separated by a dash. The number references the T&TE requirements column on the MAC. The letter represents the specific maintenance function the item is to be used with. The letter is representative of columns A through K on the MAC.

b. Maintenance Category. This column shows the lowest level of maintenance authorized to use the special tool or test equipment.

c. Nomenclature. This column lists the name or identification of the tool or test equipment.

d. Tool Number. This column lists the manufacturer's code and part number, or Federal stock number of tools and test equipment.

C-4. EXPLANATION OF COLUMNS IN SECTION IV.

a. Reference Code. This column consists of two letters separated by a dash, both of which are references to Section II. The first letter references column 5 and the second letter references a maintenance function, column 3, A through K.

b. Remarks. This column lists information pertinent to the maintenance function being performed, as indicated on the MAC, Section II.

SECTION II. MAINTENANCE ALLOCATION CHART FOR 30 KW, TACTICAL, PRECISE AND UTILITY, 50/60 AND 400 Hz (CONT)

(1)	(2)	(3) MAINTENANCE FUNCTIONS											(4)	(5)
		A	B	C	D	E	F	G	H	I	J	K		
GROUP NO.	FUNCTIONAL GROUP	INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD	TOOLS AND EQUIPMENT	REMARKS
01	Batteries and related items	C	0	C				0	0				I-B	A-A, B-B
	Slave receptacles	C							0					A-A
02	Exhaust and breather pipes	C							0					A-A
03	Convenience receptacles 50/60 Hz	C							0					A-A
04	Convenience receptacles 400 Hz	C							0					A-A
05	Plate and sleeve assy	C							0					A-A
06	Paralleling receptacles	C							0					A-A
07	Generator set controls													
	Circuit breaker, dc		0						0					
	Manual speed control	0	0						0					A-A
	Fault indicator	0	0						0	F				A-A, C-B, D-I
	Wiring harness	F	F						F	F		F		
	Lamps		C						0					
	Fuse		0						0					
	Control box assembly	0	0						F	0				C-B
	Wiring harness	0							0	0		F		A-A, H-K
	Voltmeter, ac	C	0		C				0					E-D
	Wattmeter, ac	C	F		C				0					C-B, E-D
	Wattmeter converter	0	F						0					C-B, E-D
	Ammeter, ac	C	F		C				0					C-B, E-D
	Rheostats/potentiometer	0	0						0				2-B	F-B
	Frequency meter	C	F		F				0					C-B
	Frequency transducer	0	F						0				2-B	F-B
	Switches	C	0						0				2-B	F-B
	Gauges	C	0						0					C-B
	Hourmeter	C	0						0					C-B
	Ammeter, dc	C	0						0					C-B
08	Housing group													
	Doors	C							0	F			3-I	G-I
	Covers	C							0	F			3-I	G-I
	Panels	C							0	F			3-I	G-I
09	Wiring harnesses													
	Engine	C	0						0	0		F	4-K	A-A, H-K
	Generator	C	0						H	0		H	4-K	A-A, H-K
	Interconnecting	C	0						0	0		F	4-K	A-A, H-K

MAINTENANCE ALLOCATION CHART FOR 30 KW, TACTICAL, PRECISE AND UTILITY, 50/60 AND 400 Hz (CONT)

(1)	(2)	(3) MAINTENANCE FUNCTIONS											(4)	(5)
GROUP NO.	FUNCTIONAL GROUP	A INSPECT	B TEST	C SERVICE	D ADJUST	E ALIGN	F CALIBRATE	G INSTALL	H REPLACE	I REPAIR	J OVERHAUL	K REBUILD	TOOLS AND EQUIPMENT	REMARKS
10	Load connection group													
	Main load contactor	0	0						0	F		D		A-A, C-B
	Load terminal board assy	0							F	F	H			A-A
	Current Xfmr assembly	0	F						F				2-B	A-A, I-B
	Reconnection board	0	0						0					
11	Governor control unit	0	F		F				F	F	D	D	2-B, D.I	J-B, D.I
	Electric - Hydraulic	0	F		F				F	F	H			
	Electric		F		F				F					
	Control	0	F		F				F					
	Actuator	0	F						F					
	Magnetic Pick Up	0												
12	Air cleaner assembly	C		C					0					A-A
	Element	C		C					0					
13	Relay table group													
	Tactical relay assy	0	F						F	H	H		2-B	I-B
	Special relay assy	0	F						F	H	H		2-B	I-B
	Precise relay assy	0	F						F	H	H		2-B	I-B
	Excitation assy													
	Exciter	F	F						F	F	H		2-B	F-B
	Voltage regulator	F	F		F				F	F	H	D	2-B, 5-I,J	C-B
	Load measuring unit	0	F						0	F				D-I
14	Generator assembly	0	F						F	F	H	D	6, 7-H, 8-B, 9-I, J	C-B
	Bearing	0							F				10-H	K-A
	Rectifier rotating	F	F						F	F	H		2-B,11-1	F-B
	Fan generator	F							F					
	Rotor assembly	F	F						F	D		D	2-B	L-B, M-K
	Stator exciter assy	F	F						F	D		D	2-B	L-B, M-K
	Stator generator assy	F	F						F	D		D	2-B	L-B, M-K
15	Day tank and fuel filter assy													
	Solenoid valve	0	0						0				2-B	F-B
	Day tank	C		C					0	F				N-C
	Float switch	0	0						0					
	Fuel filter assy	C		C					0					N-C

MAINTENANCE ALLOCATION CHART FOR 30 KW, TACTICAL, PRECISE AND UTILITY, 50/60 and 400 Hz (CONT)

(1)	(2)	(3) MAINTENANCE FUNCTIONS											(4)	(5)
GROUP NO.	FUNCTIONAL GROUP	A INSPECT	B TEST	C SERVICE	D ADJUST	E ALIGN	F CALIBRATE	G INSTALL	H REPLACE	I REPAIR	J OVERHAUL	K REBUILD	TOOLS AND EQUIPMENT	REMARKS
16	Center support													
	Start aid assembly	C		C					O					
	Lifting frame	O							F	F				
	Fuel transfer pump	C	O	O					O					
17	Cooling group													
	Grille	C							O	O				
	Shutter thermostat	C	O						O				12-B	O-B
	Shutter assembly	C	O		O				O	F				C-B
	Radiator	C	F	C					O	F				
18	Hydraulic actuator	C	F	O	F				F	F	H	D	13-B, D	C-B, P-D
19	Hydraulic sump and filter	C		C					F	F				Q-C
20	Engine assembly	C	O	C					F	F	H	D	6-H, 7-H	C-B
	Belts, fan	C			O				O				14-D	R-D
	Alternator/battery charging	C	O		O				O	F	H	D	2-B 15-B, D	C-B, R-D
	Diodes	F	F						F				2-B, 11-H	F-B
	Rotors	F	F						F	H	H		2-B	F-B
	Field assembly	F	F						F	H	H		2-B	F-B
	Voltage regulator, dc	F	F						F	F			2-B, 15-B	C-B
	Hydraulic pump assy	C	F		F				F	F	H	D	16-B	S-B, T-D
	Speed switch and drive													
	Speed switch	C	O		F				O	F	H	D	2-B, 17, 18-D	F-B, U-D
	Adapter	C							F					
	Oil level gage and filler	C							C					
	Electric starter & adapter													
	Starter assembly	C	O						O	O	H	D	2-B, 19-I	C-B, D-I
	Brushes	O							O					V-A
	Starter, solenoid		O						O	F			2-B	C-B
	Starter, armature		F						F	F	H		21-B	W-B
	Drive starter	F							F	F				
	Field assembly	F	F						F	F				

MAINTENANCE ALLOCATION CHART FOR 30 KW, TACTICAL, PRECISE AND UTILITY, 50/60 and 400 Hz (CONT)

(1)	(2)	(3) MAINTENANCE FUNCTIONS											(4)	(5)
		A	B	C	D	E	F	G	H	I	J	K		
GROUP NO.	FUNCTIONAL GROUP	INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD	TOOLS AND EQUIPMENT	REMARKS
20	Oil filters and sensors													
	Xmtr, pressure	C	O						O				2-B	F-B
	Switch pressure	O	O						O				2-B	F-B
	Filter assemblies													
	Oil, lube/hydraulic	C		O					O					X-C
	Secondary fuel filter	C		C					O					X-C
	Lube oil cooler	O							O	F	F			
	Injector nozzle, sleeve and lines													
	Injector nozzle	O	O		F				O	F	F		22-B, D-I	Y-D
	Nozzle sleeve	O	O						O					
	Lines	O							O					
	Pump, fuel injection	C	F		F				F	H	H	D		J-B, D-I
	Water pump and fan													
	Fan	C							F	F				
	Pump	C							O	F				
	Thermostat and housing													
	Thermostat		O						O				12-B	O-B
	Xmtr, temperature	C	O						O				2-B	F-B
	Sw, temperature	O	O						O				2-B	F-B
	Idler pulley	O							O					
	Intake manifold	O							O					
	Exhaust manifold	O							O					
	Engine front support	F							F					
	Oil pan assembly	C							F	F				
	Oil pump		H						H	H				
	Flywheel and housing													
	Flywheel assembly													
	Ring gear	H							H					
	Flywheel	H							H					
	Housing	H							H					
	Timing gear and cover													
	Cover, timing	F							H					
	Gears, timing	H							H					

MAINTENANCE ALLOCATION CHART FOR 30 KW. TACTICAL, PRECISE AND UTILITY, 50/60 and 400 Hz (CONT)

(1)	(2)	(3) MAINTENANCE FUNCTIONS											(4)	(5)
		A	B	C	D	E	F	G	H	I	J	K		
GROUP NO.	FUNCTIONAL GROUP	INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD	TOOLS AND EQUIPMENT	REMARKS
20	Cylinder head and valve operating mechanism													
	Rocker arm assy	O		O				F	F	F				
	Rocker arm	O			O				F				21-D	R-D
	Pushrod	F							F					
	Cylinder head assy	F							F	F	H	D	23-I, 24-H	Z-I
	Valve int and exh	F	F						F	F			25-I	C-B
	Spring valve		F						F				26-H	AA-B
	Seat int and exh valves	F							H				27-H	
	Guide valve	F							H				28-H	
	Head cylinder	F							F	F	H	D		
	Lifters, valve	H							H					
	Camshaft	H							H					
	Piston and rings													
	Piston pin	H							H				29-A	
	Connecting rod	H							H				30-A, 31-H	
	Rod bearing	H							H				32-A	
	Piston rings	H							H				33-A, 34-H	
	Piston	H							H				35-H	
	Crankshaft and block													
	Cylinder sleeves	H							H				32,36-A, 37-H	
	Main bearings	H							H				32,36-A, 24-H	
	Crankshaft	H							H			D	38-A	
	Bearing, camshaft	H							H				29,32-A	
	Cylinder block	H							H	H	H	D		AB-K
21	Base group													
	Sensor, fuel		O						O				2-B	C-B
	Tank, fuel	C		C					F	F				
	Skid base	O							F	F				C-I
22	Accessory items													
	Paralleling cable	C	O					O	O	O				
	Fuel line, auxiliary	C						O	O	O				

MAINTENANCE ALLOCATION CHART FOR 30 KW, TACTICAL, PRECISE AND UTILITY, 50/60 and 400 Hz (CONT)

(1)	(2)	(3) MAINTENANCE FUNCTIONS											(4)	(5)
GROUP NO.	FUNCTIONAL GROUP	A INSPECT	B TEST	C SERVICE	D ADJUST	E ALIGN	F CALIBRATE	G INSTALL	H REPLACE	I REPAIR	J OVERHAUL	K REBUILD	TOOLS AND EQUIPMENT	REMARKS
23	Parts Kits (Itemize)													
24	Fire Extinguisher							O						
25	Winterization kit													
	Fuel burning (regular)	C						O	O	F	H			
	Heater control box assy	O							O	O	F			
	Light assembly	O	O						F					
	Lamp		C						O					
	Circuit breaker	O	F						F					
	Power switch		F						F					
	Heater assembly	C	O	C	O				F	F	H			
	Valve	F							F					
	Nozzle	F							F					
	Terminal board	O							F					
	Switch	O	O						F				2-B	F-B
	Burner assembly	O							F	F				
	Igniter assembly	O							O					
	Head assembly	F							F					
	Switch, flame	F							F				2-B	F-B, R-D
	Wiring harness	O							O	O		F		A-A, H-K
	Blower assembly	F							F	F				
	Coolant pump & motor assembly													
	Pump	F	F						F	F				
	Relief valve		F						F					
	Fan motor assy	F							F	F				
	Fan	F							F					
	Motor	F							F					
	Thermostat switch	O	O						O				2-B	C-B
26	Heater kit, winterization electric							O	O	O	H	D		
	Coolant pump and motor assembly	O						O	O	F				C-B
	Pump	O	O							F	F			
	Relief valve		F							F				
	Motor	O	F							F	O			
	Heating elements	O	O							O				C-B

MAINTENANCE ALLOCATION CHART FOR 30 KW, TACTICAL, PRECISE AND UTILITY, 50/60 and 400 Hz (CONT)

(1)	(2)	(3) MAINTENANCE FUNCTIONS											(4)	(5)
GROUP NO.	FUNCTIONAL GROUP	A INSPECT	B TEST	C SERVICE	D ADJUST	E ALIGN	F CALIBRATE	G INSTALL	H REPLACE	I REPAIR	J OVERHAUL	K REBUILD	TOOLS AND EQUIPMENT	REMARKS
26	Thermostat switch	O	O						O				2-B	C-B
	Hose lines fitting	C							O	O				
	Electric wiring cables and harness	C	O						O	O		F	2-B	
	Electric winterization control box	O	O					O	O	F			2-B	
	Transformers	F	F						F					
	Relay	F	F						F				2-B	F-B
	Semi-conductors	F	F						F					
	Circuit breaker	O	O						O				2-B	F-B
	Switch toggle	O	F						F					
	Fuse holder	O							F					
	Fuse		O						O					
	Light assembly	C	O						O				2-B	F-B
	Indicating lamps	C	C						C					
27	Kit-wheel mounting	C	C	C				F	F	O				
	Wheels and tires	C	C	C					O	O			39-B	AC-B
	Bearings wheel	O		O					O					
	Brakes	O		O	O				O	O				
28	Load bank	O	O					O	O	F	H			C-B
	Wiring harness	C	O						O	O		F	2-B	F-B
	Control panel assembly													
	Switch rotary	C	O							O			2-B	F-B
	Semi-conductors	F	F						F				2-B	F-B
	Transformers	O	F						F				2-B	I-B
	Terminal board	O							O					
	Diodes		F						F					
	Breakers, circuit	O	O						O				2-B	F-B
	Fan and motor assy	O	O						O	O				
	Brushes	O							O					
	Fan	O							O					
	Indicating light	O	O						O					
	Lamp		O						O					
	Load reject relay	O	F						F				2-B	F-B
	Thermostat		O						O					
	Heater elements	O	O						O				2-B	F-B

Section III. MAINTENANCE ALLOCATION CHART

FOR: 30 KW, 50/60 and 400 Hz, DOD Generator Sets
DATE: 18 August 1972
PAGE: 1 of 2

SPECIAL TOOL AND SPECIAL TEST EQUIPMENT REQUIREMENTS

REFERENCE CODE	MAINTENANCE CATEGORY	NOMENCLATURE	TOOL NUMBER
1-B	O	Tester, Battery Elect-Rolyte Solution (Component of Tool Set L/I TI3152)	6630-171-5126 or Equal
2-B	O	Multimeter	6625-581-2036 or Equal
3-I	F	Torch Outfit, Cutting and Welding (Tool Set L/I W67706)	3433-357-6311 or Equal
4-K	O	Tool Kit, Electrical Connector Repair	5180-876-9336 or Equal
5-D, I,J	F	Oscilloscope	6625-643-1740 or Equal
6-H	F	Hoist, Chain, 3 Ton	3950-292-9879 or Equal
7-H	F	Trestle, Hoist, Portable 5 Ton	3950-449-7005 or Equal
8-B	F	Multimeter, Split Core	6625-892-1497 or Equal
9-I, J	F	Ohmmeter	6625-581-2466 or Equal
10-H	F	Puller Attachment (Component of Puller Kit 5180-701-8046)	5180-711-6753 or Equal
11-I	F	Soldering Outfit, Electric	3439-853-8760 or Equal
12-B	O	Thermometer, Self-Indicating 50-400 Degree F. Range	6685-527-7867 or Equal
13-B, D	F	Test Stand, Actuator	4940-152-2107 or Equal
14-D	O	Scale, Dial Indicating, 0-50 lb	6670-254-4634 or Equal
15-B, D	O	Test Set, Generator and Voltage Regulator	4910-270-3780 or Equal
16-B	F	Test Gage and Hose Assembly	4910-774-9343 or Equal
17-D	F	Tachometer, Stroboscopic	6680-892-1510 or Equal
18-D	F	Test Stand, Ignition Magneto	4910-912-3960 or Equal
19-I	O	Tester Spring Resiliency	6635-449-3750 or Equal
20-D	F	Gage, Thickness	5120-221-1999 or Equal
21-B	F	Test Set, Armature	6625-233-1459 or Equal
22-B, D, I	F	Tool Kit, Diesel Injector Repair	4910-317-8265 or Equal
23-I	F	Grinding Kit, Valve Seat	4910-473-6437 or Equal
24-H	F	Wrench, Torque	5120-542-5577 or Equal
25-I	F	Grinding Machine, Valve Face	4910-540-4679 or Equal
26-H	F	Lifter, Valve Spring	5120-239-8686 or Equal
27-H	H	Remover and Replacer, Insert Valve Seat	5120-473-7393 or Equal
28-H	H	Remover and Replacer, Valve Guide	5120-219-8404 or Equal
29-A	H	Caliper Micrometer, Outside 1" thru 2"	5210-243-2933 or Equal

	SPECIAL TOOL AND SPECIAL TEST EQUIPMENT REQUIREMENTS (CONT)		
REFERENCE CODE	MAINTENANCE CATEGORY	NOMENCLATURE	TOOL NUMBER
30-A	H	Indicator, Connecting Rod Alignment	4910-733-2487 or Equal
31-H	H	Wrench, Torque	5120-640-6364 or Equal
32-A	H	Gage Set, Telescoping	5120-473-9350 or Equal
33-A	H	Gage, Thickness	5210-517-8097 or Equal
34-H	H	Compressor, Piston Ring	5120-894-0753 or Equal
35-H	H	Expander, Piston Ring	5120-393-0549 or Equal
36-A	H	Caliper, Micrometer	5120-255-7564 or Equal
37-H	H	Puller, Mechanical, Cylinder, Sleeve	5120-417-2952 or Equal
38-A	H	Caliper, Micrometer	5210-221-1934 or Equal
39-B	C	Gage, Tire Pressure	4910-204-3170 or Equal

Section IV. MAINTENANCE ALLOCATION CHART

FOR: 30 KW, 50/60 and 400 Hz DOD Generator Set

DATE: 18 August 1972
PAGE: 1 of 1

REFERENCE CODE	REMARKS
A-A	Visual Inspection
B-B	Hydrometer Test
C-B	Operational Test
D-I	Repair by Replacement of Components
E-D	Zero Adjust
F-B	Continuity Test
G-I	Weld and Straighten
H-K	Fabricate New Harness
I-B	Test for Known Voltage at Terminals
J-B, D & I	In Accordance with Procedures in Applicable TM
K-A	Visual, Audible and Physical Heat Detection
L-B	Insulation Breakdown and Continuity Tests
M-K	Rewind
N-C	Drain Condensation
O-B	Thermometer Test
P-D	Adjust After Replacement or Repair
Q-C	Check Fluid Level
R-D	Adjust to Specifications in Applicable TM
S-B	Test Pressure Output
T-D	Adjust Pressure Output
U-D	Overspeed Only
V-A	Inspect for Minimum Length
W-B	Growler Test
X-C	Replace Element
Y-D	Adjust Injector Pressure Setting
Z-I	Includes Replacing Valves and Springs
AA-B	Spring Tension and Length
AB-K	Include Replacement of Sleeves
AC-B	Pressure Test

APPENDIX D
MAINTENANCE AND OPERATING SUPPLIES

Section I. INTRODUCTION

D-1. SCOPE

This appendix lists maintenance and operating supplies which are required for operation of the generator set.

D-2. EXPLANATION OF COLUMNS

a. Component Application, Column (1). This column identifies the component application of each maintenance and operating supply item.

b. National Stock Number, Column (2). This column indicates the National stock number for each item and will be used for requisitioning purposes. The number in parentheses following each stock number refers to the corresponding number of a note in column (6).

c. Description, Column (3). This column gives the name and a brief description of each item.

d. Quantity Required for Initial Operation, Column (4). This column indicates the quantity of each item required for initial operation of the generator set.

e. Quantity Required for 8 Hours of Operation, Column (5). This column indicates the estimated quantity for each item required for a normal 8 hour operating period.

f. Notes, Column (6). This column lists explanatory notes which are keyed to the numbers in parentheses appearing in columns (2), (4) and (5).

Section II. MAINTENANCE AND OPERATING SUPPLIES

(1) Component Application	(2) National Stock Number	(3) Description	(4) Quantity Required For Initial Operation	(5) Quantity Required For Initial Operation	(6) Note
		FUEL			
Tank, Fuel	9130-00-256-8613(1)	JP-4, MIL-J-5624, Bulk	(3)	(4)	(1) See Federal Supply Catalog 9100-IL for additional requisitioning data
		FUEL OIL, DIESEL			
	9140-00-286-5294(1)	Regular Grade, DF2, Bulk VV-F-800	(3)	(4)	(2) See Federal Supply Catalog 6800-IL for additional requisitioning data
	9140-00-296-5286(1)	Winter Grade, DF1, Bulk VV-F-800	(3)	(4)	(3) Tank Capacity 26 Gal.
	9140-00-286-5283(1)	Arctic Grade, DFA, Bulk VV-F-800	(3)	(4)	(4) Average Fuel Consumption is 1 Gal/10 KW-hrs.
		OIL, LUBRICATING (5 gal. pail)			
Crankcase	9150-00-265-9435(1)	Grade OE/HDO 30 MIL-L-2104	(5)	(10)	(5) Crankcase Capacity 8.0 qts.
	9150-00-265-9428(1)	Grade OE/HDO 10 MIL-L-2104	(5)	(10)	(6) Cooling System Capacity 50-50 Solution 23.5 qts.
	9150-00-242-7603(1)	Grade OES MIL-L-10295 (55 gal. drum)	(5)	(10)	(7) One Hour Consumption 3 gal.
	9150-00-265-9436(1)	Grade OE/HDO 30 MIL-L-2104	(5)	(10)	
	9150-00-191-2772(1)	Grade OE/HDO 10 MIL-L-2104	(5)	(10)	
	9150-00-242-7604(1)	Grade OES MIL-L-10295	(5)	(10)	

Section II. MAINTENANCE AND OPERATING SUPPLIES

(1) Component Application	(2) National Stock Number	(3) Description	(4) Quantity Required For Initial Operation	(5) Quantity Required For 8 Hrs Operation	(6) Note
		GREASE AUTOMOTIVE ARTILLERY (5 lb. can)			
Wheel Mounting Kit	9150-00-190-0905(1)	MIL-G-10924			
		SOLVENT (1 Gal. can)			
Parts, Cleaning	6950-00-281-1985(2)	FED-P-D-680(9)			
		STARTING AID			
Engine	2910-00-646-9727	Tank, Ether	(11)		(11) For use at 40° F. and below
		ELECTROLYTE			
Batteries	6810-00-249-9354	Electrolyte	(12)		(12) Requires 4 gallons to fill batteries.
		OIL HYDRAULIC (1 gal. can)			
Governor	9150-00-223-4134(1)	OHA-MIL-H-5606			(8) See para. 4-19 for points. (9) Use solvent prior to reassembly.
		COOLANT			
Radiator	6850-00-243-1992(2)	Anti-freeze, inhibited for glycol, 1 gal. can	(6)		(10) See LO for grade application and replenishment intervals
	6850-00-174-1806(2)	Anti-freeze, compound Arctic, 55 gal. drum			
		FUEL			
Heater	9130-00-256-8613(1)	JP-4, MIL-J-5624, Bulk Fuel Oil, Diesel	(7)		
	9140-00-286-5294(1)	Regular Grade, DF2, Bulk	(7)		
	9140-00-286-5294(1)	Winter Grade, DF1, Bulk	(7)		
	9140-00-286-5283(1)	Arctic Grade, DFA, Bulk	(7)		
	8030-00-889-3534	Tape, Anti Seizing			

APPENDIX E
ADDITIONAL AUTHORIZATION LIST

Section I. INTRODUCTION

E-1. SCOPE

This appendix lists additional items you are authorized for the support of the generator sets.

E-2. GENERAL

This list identifies items that do not have to accompany the generator sets and that do not have to be turned in with it. These items are all authorized to you by CTA, MTOE, TDA, or JTA.

E-3. EXPLANATION OF LISTING

National stock numbers, descriptions, and quantities are provided to help you identify and request the additional items you require to support this equipment. If item required differs for different models of this equipment, the model is shown under the "Usable on" heading in the description column. These codes are identified as:

Code	Used On
A	MEP-005A
B	MEP-104A
C	MEP-114A

Section II. ADDITIONAL AUTHORIZATION LIST

(1) National Stock Number	Part Number & FSCM	(2) Description	Usable On Code	(3) U/M	(4) Qty Auth
4910-00-204-3170	800648 (34623)	GAGE: Tire Pressure, 10 to 60 lbs Range	A,B,C,	EA	1
4930-00-253-2478	41G1330-72 (10001)	GREASE GUN: Hand Lever Operated, 16 oz	A,B,C	EA	1
4930-00-141-8311	1083L11 (39428)	HOSE ASSEMBLY: Grease Gun, Hydraulic Coupling One End, Other End Male Connection, 1/8 in. NPTF, 3/16 in. ID Hose, 19-11/32 in. Overall Length	A,B,C	EA	1
6115-00-463-9088	MEP005ALM (30554)	LOAD BANK KIT	A,B,C,	EA	1
4210-00-708-0031	MILE52031 (99539)	REPLACEMENT CYLINDER for 4210-00-555-8837	A,B,C	EA	1
6115-00-463-9094	MEP005AWM (30554)	WHEEL MOUNTING KIT	A,B,C	EA	1
6115-00-463-9085	MEP005AWE (30554)	WINTERIZATION KIT, Electric	A,B,C	EA	1
6115-00-463-9083	MEP005AWF(30554)	WINTERIZATION KIT, Fuel Burning	A,B,C,	EA	1
5975-00-878-3791	FS0216B122-1 (15277)	ROD, GROUND,	A,B,C		
6150-00-123-0108	133208E4816 (97403)	CABLE ASSEMBLY, POWER, ELECTRICAL	A,B,C		
5120-01-013-1676	P74-144 (45225)	PULLER,GROUND ROD	A,B,C		
4210-00-555-8837	10596569-1	EXTINGUISHER, FIRE MONOBROMOTRIFLUORIMETHANE, with bracket. Operating temperature range—minus 50°F (−46°C) to plus 120°F (49°C)	A,B,C		
		TM 5-6115-465-12 NAVFAC P-8-652-12 TO-35C2-3-446-1 TM-06858B/06859D-12 Operator and Organizational Maintenance Manual for Generator Set, Diesel Engine Driven, Tactical Skid Mtd. 30KW, 3 Phase, 4 Wire, 120/208 and 240/416 volts	A,B,C,		
5935-00-322-8959		Adapter Connector		EA	1

ALPHABETICAL INDEX

Subject — Paragraph, Figure, Table, Number

A

- AC ammeter:
  - Adjustment 3-16
  - Description 2-8
  - Operator inspection 3-16
  - Organizational maintenance 3-112
- AC voltmeter:
  - Adjustment 3-14
  - Description 2-8
  - Operator inspection 3-14
  - Organizational maintenance 3-112
- Actuator unit, hydraulic:
  - Inspection 3-32
  - Service 3-98
- Adjustments:
  - AC ammeter 3-16
  - AC voltmeter 3-14
  - Battery charging alternator 3-67
  - Brakes, wheel mounting kit 4-19
  - Flame switch, fuel burning winterization kit 4-8
  - Kilowatt meter 3-9
  - V-belt 3-90
  - Valve tappet clearance 3-109
- Air cleaner assembly:
  - Operator inspection 3-24
  - Organizational maintenance 3-101
  - Service 3-24
- Air cleaner condition indicator:
  - Description 2-8
  - Organizational maintenance 3-112
- Alternator, battery charging:
  - Operator inspection 3-36
  - Organizational maintenance 3-69
  - Tabulated data 1-6
- Ammeter, ac:
  - Adjustment 3-16
  - Description 2-8
  - Operator inspection 3-16
  - Organizational maintenance 3-112
- Ammeter, battery charging:
  - Description 2-8
  - Operator inspection 3-21
  - Organizational maintenance 3-112
- Auxiliary fuel line:
  - Description 3-139
  - Installation 2-3
  - Operator inspection 3-25
  - Organizational maintenance 3-140
- Axle assembly, front, wheel mounting kit:
  - Operator inspection 4-18
  - Organizational maintenance 4-19
- Axle assembly, wheel mounting kit:
  - Operator inspection 4-18
  - Organizational maintenance 4-19

ALPHABETICAL INDEX (CONT)

Subject — Paragraph, Figure, Table, Number

B

- Base assembly, skid 3-138
- Batteries:
  - Description 1-6
  - Installation 3-65
  - Operator inspection 3-8
  - Replacement 3-65
  - Service 3-8
  - Tabulated data 1-6
  - Testing 3-65
- Battery charging alternator:
  - Operator inspection 3-36
  - Organizational maintenance 3-68
  - Tabulated data 1-6
- Battery charging ammeter:
  - Description 2-8
  - Operator inspection 3-21
  - Organizational maintenance 3-112
- Battery charging ammeter shows no charge, field expedient repair 3-58
- Battle short indicator:
  - Description 2-8
  - Organizational maintenance 3-112
- Battle short switch:
  - Description 2-8
  - Operator inspection 3-18
  - Organizational maintenance 3-112
- Bearing, wheel, wheel mounting kit 4-19
- Brakes, wheel mounting kit 4-19
- Brake control, wheel mounting kit 4-19
- Breather 3-103
- Breather tube:
  - Operator inspection 3-10
  - Organizational maintenance 3-103

C

- Cable, paralleling:
  - Description 3-140
  - Operator inspection 3-50
  - Organizational maintenance 3-141
- Circuit breaker, dc:
  - Description 2-8
  - Organizational maintenance 3-115
- Circuit breaker, electric winterization kit:
  - Description 2-23
  - Operator inspection 4-13
  - Organizational maintenance 4-14
- Circuit breaker, convenience receptacle:
  - Operator inspection 3-11
  - Organizational maintenance 3-124
- Circuit breaker, load bank:
  - Description 2-25
  - Organizational maintenance 4-24
- Circuit breaker indicator:
  - Description 2-8
  - Organizational maintenance 3-112
- Circuit breaker switch:
  - Description 2-8
  - Operator inspection 3-18
  - Organizational maintenance 3-112

ALPHABETICAL INDEX (CONT)

Subject — Paragraph, Figure, Table, Number

- Cleaner assembly, air:
  - Operator inspection 3-24
  - Organizational maintenance 3-101
  - Service 3-24
- Connector, voltage selector, load bank:
  - Operator inspection 4-24
  - Organizational maintenance 4-25
- Contactor, main load 3-121
- Control, manual speed:
  - Description 2-8
  - Organizational maintenance 3-114
- Control, brake, wheel mounting kit 4-19
- Control assembly, heater, electric winterization kit:
  - Operator inspection 4-13
  - Organizational maintenance 4-14
- Control assembly, heater, fuel burning winterization kit:
  - Operator inspection 4-7
  - Organizational maintenance 4-8
- Control cubicle assembly:
  - Description 1-5
  - Organizational maintenance 3-112
- Control cubicle wiring harness assembly 3-112
- Control thermostat, shutter assembly 3-87
- Control unit, governor 3-117
- Controls and instruments:
  - Electric winterization kit 2-23
  - Fuel burning winterization kit 2-22
  - Generator set 2-8
  - Load bank 2-25
  - Wheel mounting kit 2-24
- Convenience receptacles:
  - Operator inspection 3-11
  - Organizational maintenance 3-124
- Conversion instructions 2-4
- Converter, thermal watt 3-112
- Coolant high temperature indicator 2-8
- Coolant hoses, electric winterization kit:
  - Operator inspection 4-13
  - Organizational maintenance 4-14
- Coolant pump assembly, electric winterization kit:
  - Operator inspection 4-13
  - Organizational maintenance 4-14
- Coolant temperature gauge:
  - Description 2-8
  - Operator inspection 3-19
  - Organizational maintenance 3-112
- Coolant temperature transmitter:
  - Operator inspection 3-47
  - Organizational maintenance 3-70
  - Tabulated data 1-6
- Coolant thermostat and housing 3-93
- Cooling fan assembly:
  - Operator inspection 3-45
  - Organizational maintenance 3-91
- Crankshaft pulley 3-105
- Current transformer assembly 3-122

ALPHABETICAL INDEX (CONT)

Subject — Paragraph, Figure, Table, Number

D

- Day tank assembly:
  - Operator inspection 3-25
  - Organizational maintenance 3-80
  - Service 3-25
- Day tank fuel level and low fuel cutoff switch:
  - Organizational maintenance 3-74
  - Tabulated data 1-6
- DC circuit breaker:
  - Description 2-8
  - Organizational maintenance 3-115
- Demolition to prevent enemy use 1-2
- Description 1-5
- Detailed lubrication information 3-4
- Differences between models 1-7
- Dimensions:
  - Overall 1-6
  - Shipping 1-6

E

- Electric winterization kit:
  - Controls and indicators 2-23
  - Description 4-9
  - Installation 4-10
  - Operating instructions 2-23
  - Operator maintenance 4-13
  - Organizational maintenance 4-14
  - Preventive maintenance checks and services 4-11
  - Replacement 4-10
  - Trouble shooting 4-12
- Electric winterization kit circuit breaker:
  - Operator inspection 4-13
  - Organizational maintenance 4-14
- Electric winterization kit coolant hoses:
  - Operator inspection 4-13
  - Organizational maintenance 4-14
- Electric winterization kit coolant pump assembly:
  - Operator inspection 4-13
  - Organizational maintenance 4-14
- Electric winterization kit fuse 4-14
- Electric winterization kit heater control assembly:
  - Operator inspection 4-13
  - Organizational maintenance 4-14
- Electric winterization kit heating elements 4-14
- Electric winterization kit indicator light:
  - Operator inspection 4-13
  - Organizational maintenance 4-14
- Electric winterization kit ON-OFF switch:
  - Description 2-23
  - Operator inspection 4-13
  - Organizational maintenance 4-14
- Electric winterization kit thermostat switch 4-14
- Electric winterization kit wiring harness assembly:
  - Operator inspection 4-13
  - Organizational maintenance 4-14
- Electro-hydraulic governing system 1-5

ALPHABETICAL INDEX (CONT)

Subject — Paragraph, Figure, Table, Number

- Electromagnetic interference suppression:
  - General methods used to obtain proper suppression 3-60
  - Interference suppression components 3-61
  - Replacement of electromagnetic suppression components 3-62
  - Testing of electromagnetic suppression components 3-62
- Engine assembly:
  - Description 1-5
  - Exercise of engine on standby service 2-14
  - Oil filter assembly service 3-4
  - Operator inspection 3-34
  - Starting 2-10
  - Stopping 2-11
  - Tabulated data 1-6
  - Testing 3-110
- Engine overheating, field expedient repair 3-56
- Engine primer switch:
  - Description 2-8
  - Operator inspection 3-18
  - Organizational maintenance 3-112
- Engine wiring harness assembly:
  - Operator inspection 3-25
  - Organizational maintenance 3-77
- Exercise of engine on standby service 2-14
- Exhaust manifold 3-107
- Exhaust pipe and muffler:
  - Operator inspection 3-10
  - Organizational maintenance 3-102

F

- Fan assembly, cooling:
  - Operator inspection 3-46
  - Organizational maintenance 3-96
- Fault location indicator fuse:
  - Description 2-8
  - Replacement 3-113
- Fault location indicator panel 3-113
- Field expedient repairs:
  - Battery charging ammeter shows no charge 3-58
  - Engine overheating 3-56
  - Fuel not strained 3-54
  - General 3-53
  - Housing filled with smoke 3-55
  - Loss of coolant 3-57
  - Loss of frequency control 3-59
- Filler tube, lubrication oil 3-39
- Filter assembly, hydraulic:
  - Operator service 3-33
  - Organizational maintenance 3-97
- Filter assembly, lubrication oil:
  - Operator inspection 4-42
  - Organizational maintenance 3-95
  - Service 3-4
- Filter assembly, secondary fuel:
  - Operator inspection 3-43
  - Organizational maintenance 3-81
  - Service 3-43
- Flame switch, fuel burning winterization kit 4-8
- Forms and records 1-2

ALPHABETICAL INDEX (CONT)

Subject	Paragraph, Figure, Table, Number
Frame assembly, lifting	3-138
Frequency adjust rheostat:	
Description	2-8
Organizational maintenance	3-112
Frequency meter:	
Description	2-8
Operator inspection	3-17
Organizational maintenance	3-112
Frequency transducer	3-112
Fuel burning winterization kit:	
Controls and indicators	2-22
Description	4-3
Inspection	4-7
Installation	4-4
Operating instructions	2-22
Organizational maintenance	4-8
Preventive maintenance checks and services	4-5
Replacement	4-4
Service	4-7
Trouble shooting	4-6
Fuel burning winterization kit flame switch	4-8
Fuel burning winterization kit fuel regulator valve assembly:	
Adjustment	4-8
Operator inspection	4-7
Service	4-7
Testing	4-8
Fuel burning winterization kit heater assembly:	
Installation	4-4
Operator inspection	4-7
Organizational maintenance	4-8
Replacement	4-5
Service	4-7
Testing	4-8
Fuel burning winterization kit heater control assembly:	
Operator inspection	4-7
Organizational maintenance	4-8
Fuel burning winterization kit igniter assembly	4-8
Fuel burning winterization kit limit switch	4-8
Fuel burning winterization kit terminal board assembly	4-8
Fuel burning winterization kit thermostat switch	4-8
Fuel filter assembly, secondary:	
Operator inspection	3-43
Organizational maintenance	3-81
Service	3-43
Fuel injection nozzle holders and lines	3-82
Fuel injection pump assembly	3-44
Fuel level gauge:	
Description	2-8
Operator inspection	3-19
Organizational maintenance	3-112
Fuel line, auxiliary:	
Description	3-138
Installation	2-3
Operator inspection	3-51
Organizational maintenance	3-139
Fuel lines	3-83
Fuel not strained, field expedient repair	3-54
Fuel regulator valve assembly, fuel burning winterization kit:	
Adjustment	4-8
Operator inspection	4-7

ALPHABETICAL INDEX (CONT)

Subject — Paragraph, Figure, Table, Number

- Fuel regulator valve assembly, fuel burning winterization kit (Continued):
  - Service 4-7
  - Testing 4-8
- Fuel solenoid valve 3-75
- Fuel strainer and filter assembly:
  - Operator inspection 3-26
  - Organizational maintenance 3-79
  - Service 3-26
- Fuel transfer pump assembly:
  - Operator inspection 3-28
  - Organizational maintenance 3-78
  - Tabulated data 1-6
- Fuse, electric winterization kit 4-14
- Fuse, fault location indicator:
  - Description 2-8
  - Replacement 3-113

G

- Gauge, coolant temperature:
  - Description 2-8
  - Operator inspection 3-19
  - Organizational maintenance 3-112
- Gauge, fuel level:
  - Description 2-8
  - Operator inspection 3-19
  - Organizational maintenance 3-112
- Gauge, oil level 3-39
- Gauge, oil pressure:
  - Description 2-8
  - Operator inspection 3-19
  - Organizational maintenance 3-112
- General lubrication information 3-3
- General methods used to obtain proper electromagnetic interference suppression 3-60
- Generator assembly:
  - Description 1-5
  - Lubrication 3-4
  - Organizational maintenance 3-132
  - Tabulated data 1-6
- Generator set:
  - Conversion instructions 2-4
  - Description 1-5
  - Grounding instructions 2-3
  - Identification 1-6
  - Inspection 2-1
  - Installation instructions 2-3
  - Operation instructions 2-9
  - Preventive maintenance checks and services 3-6
  - Service 2-1
  - Tabulated data 1-6
  - Trouble shooting 3-53
- Governing system, electro-hydraulic 1-5
- Governing system, mechanical 1-5
- Governor control unit 3-117
- Grille, radiator:
  - Operator inspection 3-29
  - Organizational maintenance 3-86
- Grounding instructions 2-3

ALPHABETICAL INDEX (CONT)

Subject — Paragraph, Figure, Table, Number

H

Heat element, load bank 4-25
Heater control assembly, electric winterization kit:
    Operator inspection 4-13
    Organizational maintenance 4-14
Heater control assembly, fuel burning winterization kit:
    Operator inspection 4-7
    Organizational maintenance 4-8
Heating element, electric winterization kit 4-14
Hoses, electric winterization kit coolant:
    Operator inspection 4-15
    Organizational maintenance 4-14
Heater assembly, fuel burning winterization kit:
    Installation 4-4
    Operator inspection 4-7
    Organizational maintenance 4-8
    Replacement 4-5
    Service 4-7
    Testing 4-8
Hourmeter:
    Description 2-8
    Operator inspection 3-20
    Organizational maintenance 3-112
Housing assembly:
    Lubrication 3-4
    Operator inspection 3-22
    Organizational maintenance 3-134
Housing, coolant thermostat 3-98
Housing filled with smoke, field expedient repair 3-55
Hydraulic actuator unit:
    Inspection 3-32
    Service 3-97
Hydraulic lines 3-99
Hydraulic oil pump assembly 3-38
Hydraulic sump and filter:
    Operator service 3-33
    Organizational maintenance 3-97

I

Identification and tabulated data 1-6
Igniter assembly, fuel burning winterization kit 4-8
Indicator, air cleaner condition:
    Description 2-8
    Organizational maintenance 3-112
Indicator, battle short:
    Description 2-8
    Organizational maintenance 3-112
Indicator, circuit breaker:
    Description 2-8
    Organizational maintenance 3-112
Indicator, coolant high temperature 2-8
Indicator, low oil pressure 2-8
Indicator, no fuel 2-8
Indicator, overload 2-8
Indicator, overspeed 2-8
Indicator, overvoltage 2-8
Indicator, reverse power 2-8
Indicator, short circuit 2-8
Indicator, under frequency 2-8
Indicator, under voltage 2-8

ALPHABETICAL INDEX (CONT)

Subject — Paragraph, Figure, Table, Number

- Indicator light, electric winterization kit:
  - Operator inspection 4-13
  - Organizational maintenance 4-14
- Indicator light, load bank 4-25
- Indoor installation 2-3
- Initial inspection 2-1
- Initial servicing 2-1
- Instruments:
  - Electric winterization kit 2-23
  - Fuel burning winterization kit 2-22
  - Generator set 2-8
  - Load bank 2-25
- Installation of electric winterization kit 4-10
- Installation of equipment used in conjunction with the generator set:
  - Electric winterization kit 4-10
  - Fuel burning winterization kit 4-4
  - Load bank 4-21
- Installation of fuel burning winterization kit 4-4
- Installation of generator set 2-3
- Installation of load bank 4-21
- Installation of separately packed components 2-2
- Instruction plates 1-6
- Intake manifold 3-106
- Interconnecting wiring harness assembly:
  - Operator inspection 3-23
  - Organizational maintenance 3-118
- Interference suppression components, electromagnetic 3-61

K

- Kilowatt meter:
  - Adjustment 3-15
  - Description 2-8
  - Operation inspection 3-15
  - Organizational maintenance 3-112
- Kit, electric winterization:
  - Controls and indicators 2-23
  - Description 4-9
  - Installation 4-10
  - Operating instructions 2-23
  - Operator maintenance 4-13
  - Organizational maintenance 4-14
  - Preventive maintenance checks and services 4-11
  - Replacement 4-10
  - Troubleshooting 4-12
- Kit, fuel burning winterization:
  - Controls and indicators 2-22
  - Description 4-3
  - Inspection 4-7
  - Installation 4-4
  - Operating instructions 2-22
  - Organizational maintenance 4-8
  - Preventive maintenance checks and services 4-5
  - Replacement 4-4
  - Service 4-7
  - Troubleshooting 4-6
- Kit, wheel mounting:
  - Controls 2-24
  - Description 4-15
  - Operating instructions 2-24

ALPHABETICAL INDEX (CONT)

Subject — Paragraph, Figure, Table, Number

Kit, wheel mounting (continued):
- Operator maintenance 4-18
- Organizational maintenance 4-19
- Preventive maintenance checks and services 4-16
- Troubleshooting 4-17

L

Lifting frame 3-137
Light, indicator, electric winterization kit:
- Operator inspection 4-13
- Organizational maintenance 4-14

Light, indicator, load bank 4-25
Light assembly, panel 3-112
Light assembly, synchronizing:
- Description 2-8
- Organizational maintenance 3-112

Light switch, panel:
- Description 2-8
- Operator inspection 3-18
- Organizational maintenance 3-112

Limit switch, fuel burning winterization kit 4-8
Load bank:
- Controls and indicators 2-25
- Description 4-20
- Installation 4-21
- Operating instructions 2-25
- Operator maintenance 4-24
- Organizational maintenance 4-25
- Preventive maintenance checks and services 4-22
- Replacement 4-21
- Testing 4-21
- Troubleshooting 4-23

Load bank circuit breaker 4-25
Load bank heater elements 4-25
Load bank indicator light 4-25
Load bank load reject relay 4-25
Load bank load selector switch 4-25
Load bank terminal board assembly 4-25
Load bank thermostat 4-25
Load bank transformers 4-25
Load bank voltage selector connectors:
- Operator inspection 4-24
- Organizational maintenance 4-25

Load bank wiring harness assembly:
- Operator inspection 4-24
- Organizational maintenance 4-25

Load connection instructions 2-3
Load contactor, main 3-121
Load measuring unit 3-116
Load reject relay, load bank 4-25
Loss of coolant, field expedient repair 3-57
Load sharing:
- Connection instructions 2-3
- Operation (tactical precise sets) 2-12
- Operation (tactical utility sets) 2-13

Load terminal board assembly 3-123

ALPHABETICAL INDEX (CONT)

Subject — Paragraph, Figure, Table, Number

Load transfer:
- Connection instructions 2-3
- Operation (tactical precise sets) 2-12
- Operation (tactical utility sets) 2-13

Loss of frequency control, field expedient repair 3-59
Low oil pressure indicator 2-8
Low oil pressure switch 3-73
Lubrication:
- Detailed information 3-4
- General information 3-3

Lubrication oil filter assembly:
- Operator inspection 3-42
- Organizational maintenance 3-95
- Service 3-4

M

Main fuel tank 3-49
Main load contactor 3-121
Manifold, exhaust 3-107
Manifold, intake 3-106
Manual speed control:
- Description 2-8
- Organizational maintenance 3-114

Materials used in conjunction with the generator set:
- Auxiliary fuel line 4-26
- Electric winterization kit 4-9
- Fuel burning winterization kit 4-3
- Load bank 4-10
- Paralleling cable 4-28
- Scope 4-1
- Service upon receipt of materials 4-2
- Wheel mounting kit 4-15

Measuring unit, load 3-116
Mechanical governing system 1-5
Meter, kilowatt:
- Adjustment 3-15
- Description 2-8
- Operator inspection 3-15
- Organizational maintenance 3-112

Meter, frequency:
- Description 2-8
- Operator inspection 3-17
- Organizational maintenance 3-112

Meter, running time:
- Description 2-8
- Operator inspection 3-20
- Organizational maintenance 3-112

Movement of the generator set 2-5
Muffler:
- Operator inspection 3-10
- Organizational maintenance 3-102

No fuel indicator 2-8
Nozzle holders, fuel injection 3-83

ALPHABETICAL INDEX (CONT)

Subject	Paragraph, Figure, Table, Number
O	
Oil level gauge and filler tube inspection and replacement	3-14
Oil pan assembly	3-48
Oil pressure gauge:	
Description	2-8
Operator inspection	3-19
Organizational maintenance	3-112
Oil pressure transmitter:	
Operator inspection	3-41
Organizational maintenance	3-71
Tabulated data	1-6
ON-OFF switch, electric winterization kit:	
Description	2-23
Operator inspection	4-13
Organizational maintenance	4-14
Operation at high altitude	2-20
Operation in dusty or sandy areas	2-17
Operation in extreme cold	2-15
Operation in extreme heat	2-16
Operation in salt water areas	2-19
Operation of electric winterization kit	2-23
Operation of equipment used in conjunction with the generator set:	
Electric winterization kit	2-23
Fuel burning winterization kit	2-22
General	2-21
Load bank	2-25
Wheel mounting kit	2-24
Operation of fuel burning winterization kit	2-22
Operation of load bank	2-25
Operation of start aid assembly	2-15
Operation of tactical precise generator sets	2-12
Operation of tactical utility generator sets	2-13
Operation under rainy or humid conditions	2-18
Operation under unusual conditions:	
Operation in dusty or sandy areas	2-17
Operation in extreme cold	2-15
Operation in extreme heat	2-16
Operation at high altitudes	2-10
Operation under rainy or humid conditions	2-18
Operation in salt water areas	2-19
Operation under usual conditions:	
General	2-9
Operation of tactical precise generator sets	2-12
Operation of tactical utility generator sets	2-13
Starting the generator set	2-10
Stopping the generator set	2-11
Operations switch:	
Description	2-8
Operator inspection	3-18
Organizational maintenance	3-112
Organizational maintenance repair parts	3-2
Organizational maintenance tools and equipment	3-1
Outdoor installation	2-3
Overall dimensions and weights	1-6
Overload indicator	2-8
Overspeed indicator	2-8
Overtemperature switch	3-72
Over voltage indicator	2-8

ALPHABETICAL INDEX (CONT)

Subject	Paragraph, Figure, Table, Number
P	
Pan assembly, oil	3-48
Panel, fault location indicator	3-113
Panel light assembly	3-112
Panel light switch:	
Description	2-8
Operator inspection	3-18
Organizational maintenance	3-112
Parallel operation:	
Connections	2-3
Precise generator sets	2-12
Utility generator sets	2-13
Paralleling cable:	
Description	3-141
Operator inspection	3-50
Organizational maintenance	3-142
Paralleling receptacles:	
Operator inspection	3-13
Organizational maintenance	3-125
Pipe, exhaust:	
Operator inspection	3-10
Organizational maintenance	3-102
Plate and sleeve assembly:	
Operator inspection	3-12
Organizational maintenance	3-135
Plates, instruction	1-6
Precise relay assembly (50/60 Hz)	3-128
Precise relay assembly (400 Hz)	3-130
Preparation of the generator set for movement	2-5
Preparation for starting the generator set	2-10
Pressure gauge, oil:	
Description	2-8
Operator inspection	3-19
Organizational maintenance	3-112
Pressure transmitter, oil:	
Operator inspection	3-41
Organizational maintenance	3-71
Tabulated data	1-6
Preventive maintenance checks and services:	
Electric winterization kit	4-11
Fuel burning winterization kit	4-5
Generator set	3-6
Load bank	4-22
Wheel mounting kit	4-16
Pulley, crankshaft	3-105
Pump assembly, coolant, electric winterization kit·	
Operator inspection	4-13
Organizational maintenance	4-14
Pump assembly, fuel injection	3-44
Pump assembly, fuel transfer:	
Operator inspection	3-28
Organizational maintenance	3-75
Tabulated data	1-6
Pump assembly, oil, hydraulic	3-38
Pump assembly, water:	
Operator inspection	3-46
Organizational maintenance	3-92

ALPHABETICAL INDEX (CONT)

Subject — Paragraph Figure, Table, Number

R

Radiator assembly:
  Operator inspection ... 3-31
  Organizational maintenance ... 3-88
  Service ... 3-31
  Tabulated data ... 1-6
Radiator grille:
  Operator inspection ... 3-29
  Organizational maintenance ... 3-86
Receptacles, convenience:
  Operator inspection ... 3-11
  Organizational maintenance ... 3-124
Receptacles, paralleling:
  Operator inspection ... 3-13
  Organizational maintenance ... 3-125
Receptacles, slave:
  Operator inspection ... 3-9
  Organizational maintenance ... 3-66
Reconnection board assembly, voltage ... 3-120
Records ... 1-2
Regulator valve assembly, fuel, fuel burning winterization kit:
  Adjustment ... 4-8
  Operator inspection ... 4-7
  Service ... 4-7
  Testing ... 4-8
Reinstallation after movement ... 2-6
Relay, reject, load bank ... 4-24
Relay assembly, precise, 50/60 Hz ... 3-128
Relay assembly, precise 400 Hz ... 3-130
Relay assembly, special, 50/60 Hz ... 3-127
Relay assembly, special, 400 Hz ... 3-129
Relay assembly, tactical ... 3-126
Repair parts ... 3-2
Repairs, field expedient:
  Battery charging ammeter shows no charge ... 3-58
  Engine overheating ... 3-56
  Fuel not strained ... 3-54
  General ... 3-53
  Housing filled with smoke ... 3-55
  Loss of coolant ... 3-57
  Loss of frequency control ... 3-59
Reverse power indicator ... 2-8
Rheostat, frequency adjust:
  Description ... 2-8
  Organizational maintenance ... 3-112
Rheostat, voltage adjust:
  Description ... 2-8
  Organizational maintenance ... 3-112
Rocker arm assembly ... 3-108
Running time meter:
  Description ... 2-8
  Operator inspection ... 3-20
  Organizational maintenance ... 3-112

S

Safety devices, tabulated data ... 1-6
Scope ... 1-1

ALPHABETICAL INDEX (CONT)

Subject — Paragraph, Figure, Table, Number

- Secondary fuel filter assembly:
  - Operator inspection 3-43
  - Organizational maintenance 3-81
  - Service 3-43
- Separately packed components 2-2
- Speed control, manual:
  - Description 2-8
  - Organizational maintenance 3-114
- Shipment and storage 1-4
- Shipping dimensions and weights 1-6
- Short circuit indicator 2-8
- Shutter assembly:
  - Operator inspection 3-30
  - Organizational maintenance 3-89
- Shutter control thermostat 3-87
- Single unit operation:
  - Operation of precise generator sets 2-12
  - Operation of utility generator sets 2-13
  - Starting the generator set 2-10
  - Stopping the generator set 2-11
- Skid base assembly 3-138
- Slave receptacles:
  - Operation inspection 3-9
  - Organizational maintenance 3-66
- Special relay assembly, 50/60 Hz 3-127
- Special relay assembly, 400 Hz 3-129
- Special tools 3-1
- Speed switch:
  - Operator inspection 3-37
  - Organizational maintenance 3-69
  - Tabulated data 1-6
- Start aid assembly:
  - Operation 2-15
  - Operator inspection 3-27
  - Organizational maintenance 3-84
  - Service 3-27
- START-RUN-STOP switch:
  - Description 2-8
  - Operator inspection 3-18
  - Organizational maintenance 3-112
- Starter assembly:
  - Operator inspection 3-40
  - Organizational maintenance 3-67
  - Tabulated data 1-6
- Starting the generator set 2-10
- Stopping the generator set 2-11
- Storage of the generator set 1-4
- Strainer and filter assembly, fuel:
  - Operator inspection 3-26
  - Organizational maintenance 3-79
  - Service 3-26
- Sump, hydraulic:
  - Operator service 3-33
  - Organizational maintenance 3-97
- Switch, battle short:
  - Description 2-8
  - Operator inspection 3-18
  - Organizational maintenance 3-112

ALPHABETICAL INDEX (CONT)

Subject — Paragraph, Figure, Table, Number

- Switch, circuit breaker:
  - Description 2-8
  - Operator inspection 3-18
  - Organizational maintenance 3-112
- Switch, day tank fuel level and low fuel cutoff:
  - Organizational maintenance 3-74
  - Tabulated data 1-6
- Switch, engine primer:
  - Description 2-8
  - Operator inspection 3-18
  - Organizational maintenance 3-112
- Switch, flame, fuel burning winterization kit 4-8
- Switch, limit, fuel burning winterization kit 4-8
- Switch, load selector, load bank 4-25
- Switch, low oil pressure 3-73
- Switch, operations:
  - Description 2-8
  - Operator inspection 3-18
  - Organizational maintenance 3-112
- Switch, overtemperature 3-71
- Switch, speed:
  - Operator inspection 3-37
  - Organizational maintenance 3-69
  - Tabulated data 1-6
- Switch, START-RUN-STOP:
  - Description 2-8
  - Operator inspection 3-18
  - Organizational maintenance 3-112
- Switch, test or reset 2-8
- Switch, thermostat, fuel burning winterization kit 4-8
- Switch, thermostat, electric winterization kit 3-13
- Switch, voltage sensing:
  - Description 2-8
  - Operator inspection 3-18
- Switch, volts-amps transfer:
  - Description 2-8
  - Organizational maintenance 3-112
- Synchronizing light assembly:
  - Description 2-8
  - Organizational maintenance 3-112

T

- Tabulated data 1-6
- Tactical relay assembly 3-126
- Tank assembly, day:
  - Operator inspection 3-25
  - Organizational maintenance 3-80
  - Service 3-25
- Tank assembly, fuel, main 3-49
- Temperature gauge, coolant:
  - Description 2-8
  - Operator inspection 3-19
  - Organizational maintenance 3-112
- Temperature transmitter, coolant:
  - Operator inspection 3-47
  - Organizational maintenance 3-70
  - Tabulated data 1-6

ALPHABETICAL INDEX (CONT)

Subject	Paragraph, Figure, Table, Number
Terminal board assembly, fuel burning winterization kit	4-8
Terminal board assembly, load	3-123
Terminal board assembly, load bank	4-25
Test or reset switch	2-8
Thermal watt converter	3-112
Thermostat, coolant	3-93
Thermostat, load bank	4-25
Thermostat shutter control	3-87
Thermostat switch, electric winterization kit	4-14
Thermostat switch, fuel burning winterization kit	4-8
Tires, wheel mounting kit:	
Operator maintenance	4-18
Organizational maintenance	4-19
Tools and equipment	3-1
Tool Stowage Box	3-138
Transformer assembly, current	3-122
Transformer, load bank	4-25
Transducer, frequency	3-112
Transfer pump assembly, fuel:	
Operator inspection	3-28
Organizational maintenance	3-78
Tabulated data	1-6
Transmitter, coolant temperature:	
Operator inspection	3-44
Organizational maintenance	3-70
Tabulated data	1-6
Transmitter, oil pressure:	
Operator inspection	3-41
Organizational maintenance	3-71
Tabulated data	1-6
Trouble Shooting:	
Electric winterization kit	4-12
Fuel burning winterization kit	4-6
Generator set	3-53
Load bank	4-23
Wheel mounting kit	4-17
U	
Under frequency indicator	2-11
Under voltage indicator	2-11
V-belt:	
Adjustment	3-90
Operator inspection	3-35
Organizational maintenance	3-90
Valve, fuel solenoid	3-75
Valve assembly, fuel regulator, fuel burning winterization kit:	
Adjustment	4-8
Operator inspection	4-7
Service	4-7
Testing	4-8
Valve tappet clearance adjustment	3-109
Voltage adjust rheostat:	
Description	2-8
Organizational maintenance	3-112
Voltage reconnection board assembly	3-120
Voltage selector connectors, load bank:	
Operator inspection	4-24
Organizational maintenance	4-25

ALPHABETICAL INDEX (CONT)

Subject — Paragraph, Figure, Table, Number

Voltage sensing switch:
- Description 2-8
- Operator inspection 3-18
- Organizational maintenance 3-112

Voltmeter, ac:
- Adjustment 3-14
- Description 2-8
- Operator inspection 3-14
- Organizational maintenance 3-112

VOLTS-AMPS transfer switch:
- Description 2-8
- Organizational maintenance 3-112

W

Water pump assembly:
- Operator inspection 3-46
- Organizational maintenance 3-92

Watt converter, thermal 3-112

Weights:
- Overall 1-6
- Shipping 1-6

Wheels, wheel mounting kit:
- Operator maintenance 4-18
- Organizational maintenance 4-19

Wheel bearings, wheel mounting kit 4-19

Wheel mounting kit:
- Controls 2-24
- Description 4-15
- Operation 2-24
- Operator maintenance 4-18
- Organizational maintenance 4-19
- Preventive maintenance checks and services 4-16
- Troubleshooting 4-17

Wheel mounting kit wheel bearings 4-19

Wheel mounting kit brakes 4-19

Wheel mounting kit brake controls 4-19

Wheel mounting kit front axle assembly:
- Operator maintenance 4-18
- Organizational maintenance 4-19

Wheel mounting kit rear axle assembly:
- Operator maintenance 4-18
- Organizational maintenance 4-19

Wheel mounting kit wheels and tires:
- Operator maintenance 4-18
- Organizational maintenance 4-19

Winterization kit, electric:
- Controls and indicators 3-22
- Description 4-9
- Installation 4-10
- Operating instructions 2-23
- Operator maintenance 4-13
- Organizational maintenance 4-14
- Preventive maintenance checks and services 4-11
- Replacement 4-10
- Troubleshooting 4-12

ALPHABETICAL INDEX (CONT)

Subject — Paragraph, Figure, Table, Number

- Winterization kit, fuel burning:
  - Controls and indicators 2-22
  - Description 4-3
  - Inspection 4-7
  - Installation 4-4
  - Operating instructions 2-22
  - Organizational maintenance 4-8
  - Preventive maintenance checks and services 4-5
  - Replacement 4-4
  - Service 4-7
  - Troubleshooting 4-6
- Wiring harness assembly, control cubicle 3-112
- Wiring harness assembly, electric winterization kit:
  - Operator inspection 4-13
  - Organizational maintenance 4-14
- Wiring harness assembly, engine:
  - Operator inspection 3-23
  - Organizational maintenance 3-76
- Wiring harness assembly, interconnecting:
  - Operator inspection 3-23
  - Organizational maintenance 3-118
- Wiring harness assembly, load bank:
  - Operator inspection 4-24
  - Organizational maintenance 4-25

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ASSEMBLIES

A1	CONVERTOR THERMAL WATT
A2	CONVERTOR FREQUENCY
A3	CONTROL CUBICLE
A4	CONTROL PANEL RELAY ASSY
A5	DC RELAY ASSY
A6	RESISTOR ASSY GOV
A7	RESISTOR ASSY CURRENT TRANSFORMER LOAD
A8	GOVERNOR LMU
A9	FAULT INDICATOR SYSTEM
A11	STATIC EXCITER
A12	REMOTE CONTROL BOX
A15	LOAD TEPMINALS
A16	HEATER CONTROL BOX
A17	FUEL FIRED WINTERIZATION
A22	CONVENIENCE RECEPTACLE BOX
A23	GOVERNOR CONTROL UNIT
A24	GOVERNOR ACTUATOR
A25	PRECISE RELAY BOX
A27	SET SPECIAL RELAY BOX

B1	STARTER MOTOR
B2	FUEL PUMP
B3	FUEL PUMP

C1	CAPACITORS GOVERNOR

CB1	CIRCUIT BREAKER D.C. CONTROL
CB2	CONTACTOR MAIN AC OUTPUT
CB3	CIRCUIT BREAKER CONVENIENCE RECEPTACLE

CR1	DIODE FULL WAVE BRIDGE REMOTE SENSING CIRCUIT
CR3	DIODE START CIRCUIT
CR4	DIODE FULL WAVE BRIDGE K7 CIRCUIT
CR6	DIODE FUEL PUMPS
CR27	DIODE MODULE RVS POLARITY INDUCTIVE SPIKE SUPPR

CT1	INSTRUMENTS
CT2	INSTRUMENTS
CT3	INSTRUMENTS
CT4	EXCITER
CT5	EXCITER
CT6	EXCITER
CT7	CROSS CURRENT

LIGHTS

DS1	PANEL
DS2	PANEL
DS3	PANEL
DS4	SYNCHRONIZING
DS5	SYNCHRONIZING
DS6	INDICATOR CIRCUIT BREAKER (CONTACTOR)
DS7	PROTECTION BY PASS
DS8	INDICATOR AIR CLEANER

E6	GENERATOR SET GROUND STUD
E4	SET SPECIAL BOX GROUND STUD
E3	TACTICAL RELAY BOX GROUND STUD
E2	PRECISE RELAY BOX GROUND STUD
E1	ENGINE GROUND

G1	MAIN ALTERNATOR
G2	BATTERY CHARGING ALTERNATOR

RELAYS

K1	STOP-RUN
K2	OVERVOLTAGE
K3	CRANK
K5	FIELD FLASH
K6	REMOTE VOLTAGE SENSING
K7	PARALLEL LIGHTS VOLTAGE SENSOR
K8	FUEL LEVEL
K11	UNDERVOLTAGE
K12	UNDERFREQUENCY
K13	SHORT CIRCUIT
K14	OVERLOAD
K15	REVERSE POWER
K16	PERMISSIVE PARALLELING

L1	ENGINE FUEL SOLENOID
L2	DAY TANK FUEL SOLENOID
L3	ETHER SOLENOID
L4	STARTER SOLENOID

METERS

M1	OIL PRESSURE
M2	COOLANT TEMPERATURE
M3	FUEL LEVEL
M4	BATTERY CHARGING
M5	TOTAL TIME
M6	FREQUENCY
M7	KILOWATT
M8	AMMETER
M9	VOLTMETER

MT1	OP SENDING UNIT
MT2	WT SENDING UNIT
MT3	FL SENDING UNIT

RESISTORS

R1	RHEOSTAT FREQ ADJUST	500
R2	RHEOSTAT VOLTAGE ADJUST	250
R3	RESISTOR DROPPING FOR CR4 (K7)	1500
R4	RESISTOR FREQ ADJUST CIRCUIT	250
R5	RESISTOR FREQ ADJUST CIRCUIT	250
R6	RESISTOR PARALLELING LIGHT	5000
R7	RESISTOR PARALLELING LIGHT	2500
R8	RESISTOR PARALLELING LIGHT	2500
R9	RESISTOR PARALLELING LIGHT	5000
R10	RESISTOR DROPPING FOR CR1 (K6)	1500
R23	RESISTOR GOVERNOR	7.5
R24	RESISTOR GOVERNOR	7.5
R25	RESISTOR GOVERNOR	7.5
R28	RHEOSTAT LOAD SHARING	25000
R29	RHEOSTAT REACTIVE CURRENT SHARING	12
R31	RHEOSTAT RATE ADJUST VOLTAGE REGULATOR	10 Ω
R13	SHUNT INSTRUMENT	

SWITCHES

FL-1	FUEL LEVEL
FL-2	FUEL LEVEL
OP	LOW OIL PRESSURE
WT	HIGH COOLANT TEMPERATURE

S1	ENGINE PRIMER
S2	START-RUN-STOP
S3	CONTACTOR
S4	PANEL LIGHTS
S5	LOCAL-REMOTE VOLTAGE
S6	UNIT-PARALLEL
S7	BATTLE SHORT
S8	VOLT-AMP SELECTOR
S9	ENGINE SPEED
S10	50/60 HERTZ
S17	AIR CLEANER

TERMINAL BOARDS

TB5	TERMINAL BOARD LOAD
TB6	TERMINAL BOARD RECONNECTION
TB16	TERMINAL BOARD FIELD

NOTES:

1. INTERPRET DRAWING PER MIL-STD-100.
2. FOR UTILITY CONFIGURATION, OMIT THE FOLLOWING FROM THE LIST: A23, A24, A25, E2, K11, K12, R28, K16, S10, C1, R5.
3. FOR 400 Hz CONFIGURATION OMIT SWITCH S10 FROM THE LIST.
4. FOR 50/60 Hz SET, T5 AND T11 CONNECT DIRECTLY TO TB6 AND DO NOT PASS THROUGH CT7.

ME 5-6115-465-12/FO-1 (1)

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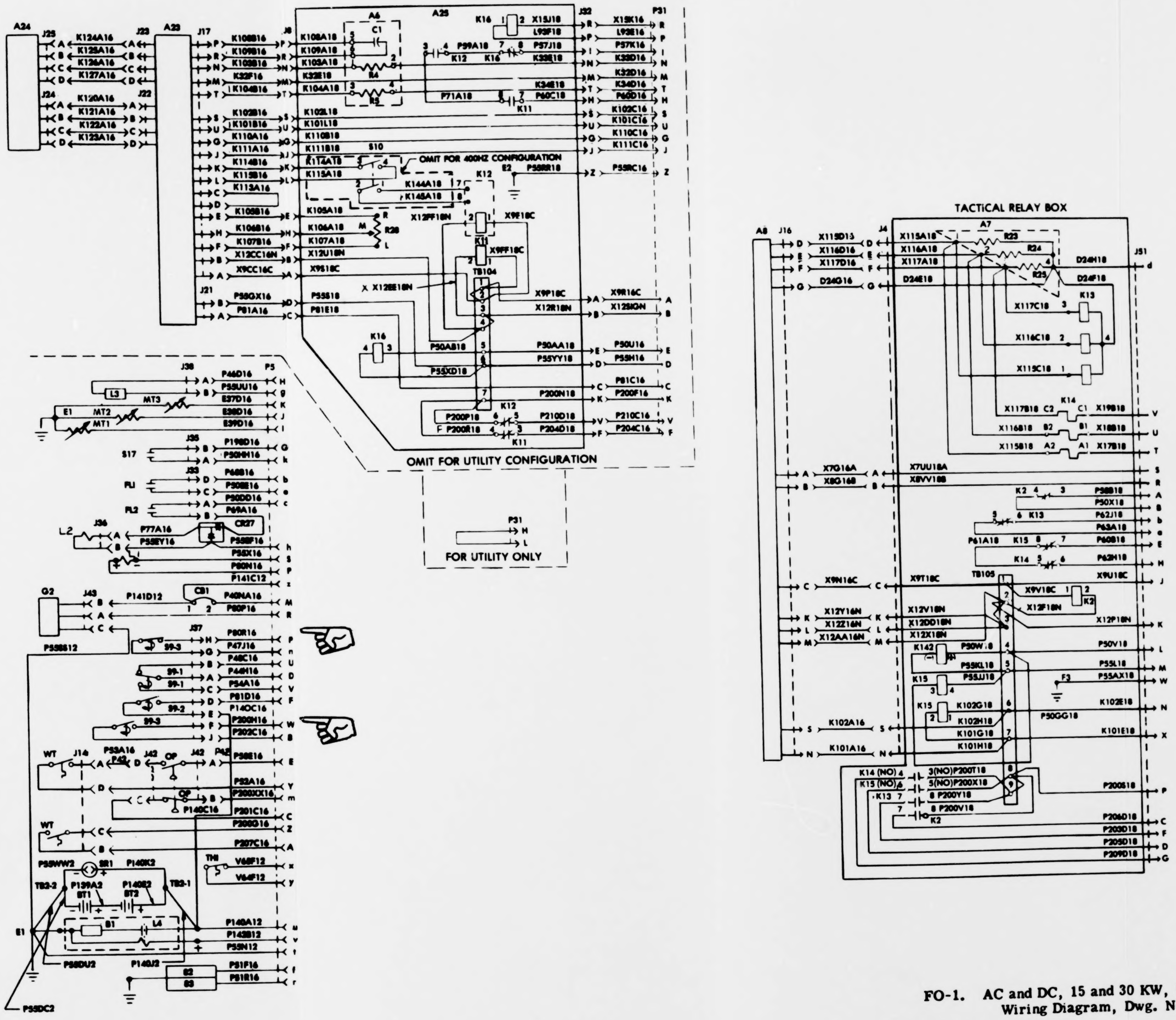
A24
J25
J24
J23
J22
A23
J17
J21
J8
A25
A6
C1
R4
R5
K16
K12
K11
J32
P31
S10
OMIT FOR 400HZ CONFIGURATION
E2
R28
TB104
OMIT FOR UTILITY CONFIGURATION
FOR UTILITY ONLY
J38
P5
L3
MT2
MT3
MT1
E1
J35
S17
J33
FL1
FL2
L2
J36
CR27
G2
J43
CB1
J37
S9-3
S9-1
S9-2
WT
J16
J42
OP
TH1
SR1
TB3-2
TB3-1
BT1
BT2
B1
L4
TACTICAL RELAY BOX
A8
J4
A7
R23
R24
R25
J51
K13
K14
K15
K2
TB105
K142
F3

ME 6115-465-12/FO-1 (2) C2

ME 6115-464-12/FO-1 (2) C2

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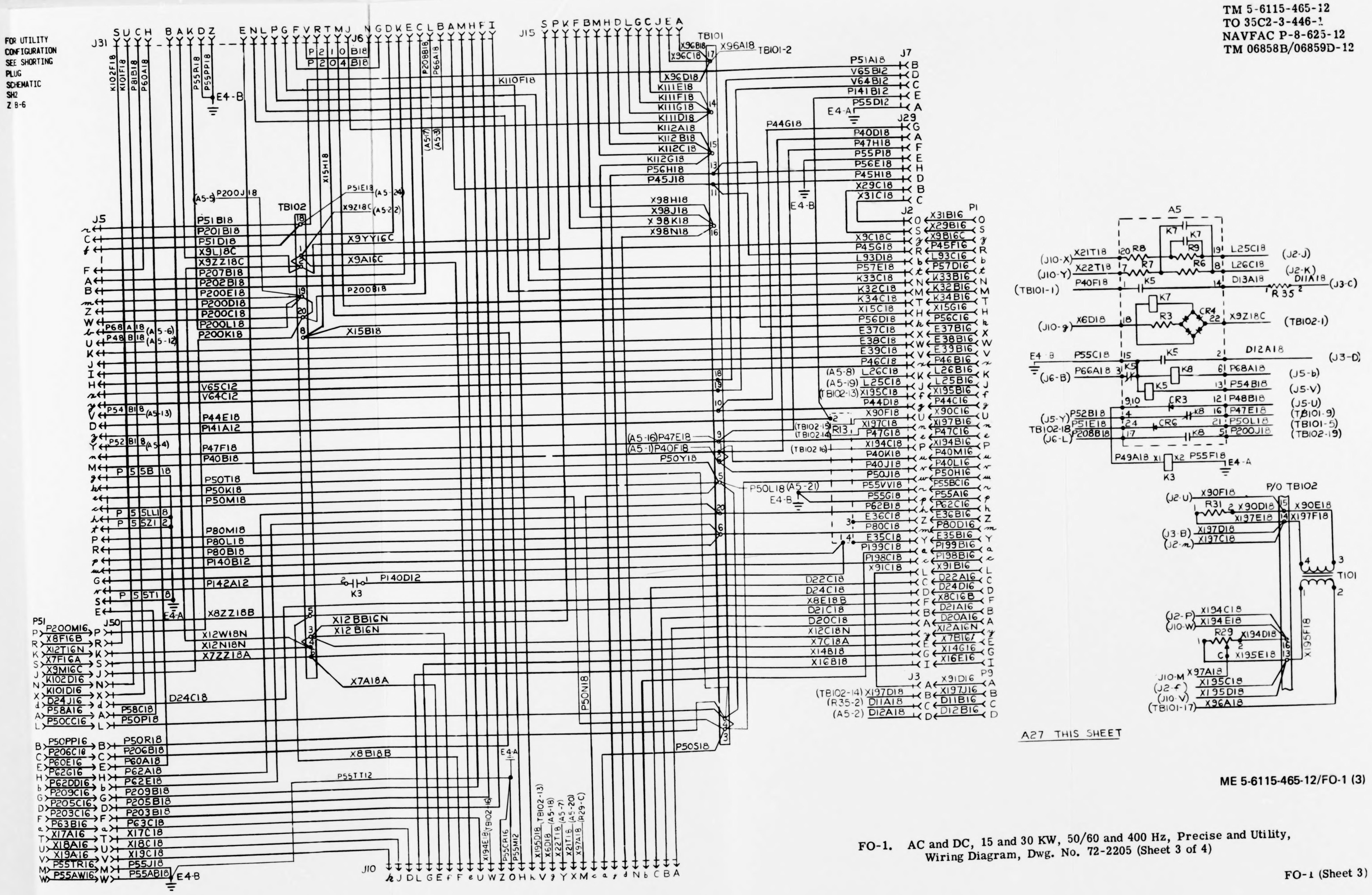
FOR UTILITY CONFIGURATION SEE SHORTING PLUG SCHEMATIC SH2 Z B-6
J31
J6
J15
TB101
TB101-2
J7
J29
J2
P1
J5
TB102
J50
P51
J3
P9
J10
K3
A5
K5
K7
R3
CR4
CR3
CR6
K8
R35
R13
P/O TB102
R31
R29
T101
E4-A
E4-B
A27 THIS SHEET

ME 5-6115-465-12/FO-1 (3)

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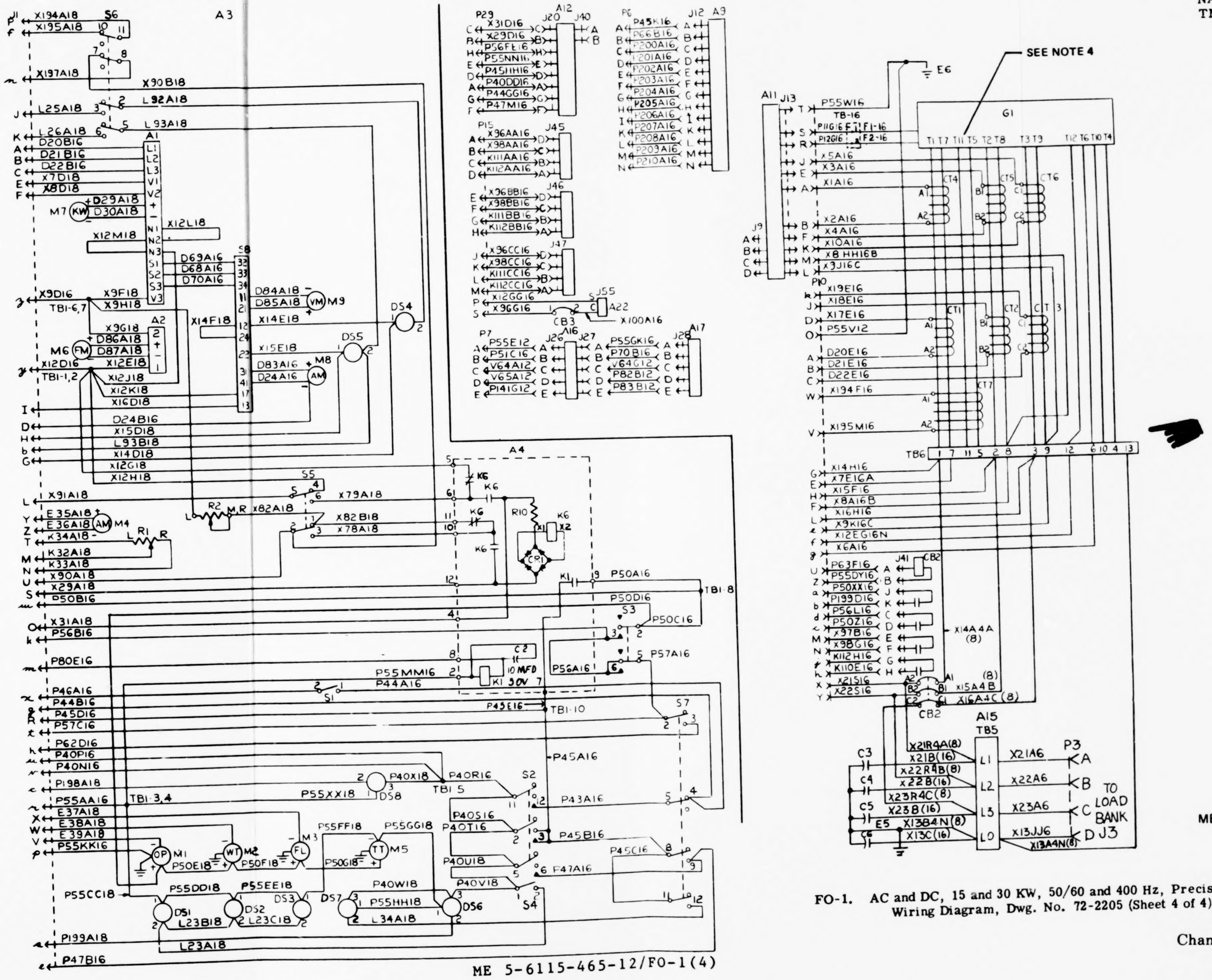
A3
S6
A1
A2
M7 KW
M6 FM
S8
M9 VM
M8 AM
DS4
DS5
A12
J20
J40
P29
P6
J12
A9
P15
J45
J46
J47
J55
CB3
A22
X100A16
P7
J26
J27
J28
A17
A4
K6
R10
CR1
C2
10 MFD
K1 30V
S3
S5
S7
R2
R1
M4 AM
S1
S2
S4
TB1-10
TB1-8
TB1-5
TB1-3,4
TB1-6,7
TB1-1,2
M1 OP
M2 WT
M3 FL
M5 TT
DS1
DS2
DS3
DS6
DS7
DS8
ME 5-6115-465-12/FO-1(4)
SEE NOTE 4
E6
G1
A11
J13
J9
P10
CT1
CT2
CT3
CT4
CT5
CT6
CT7
TB6
J41
CB2
X14A4A (8)
A15
TB5
C3
C4
C5
C6
E5
P3
TO LOAD BANK
J3
ME

FO-1. AC and DC, 15 and 30 KW, 50/60 and 400 Hz, Precise and Utility, Wiring Diagram, Dwg. No. 72-2205 (Sheet 4 of 4)

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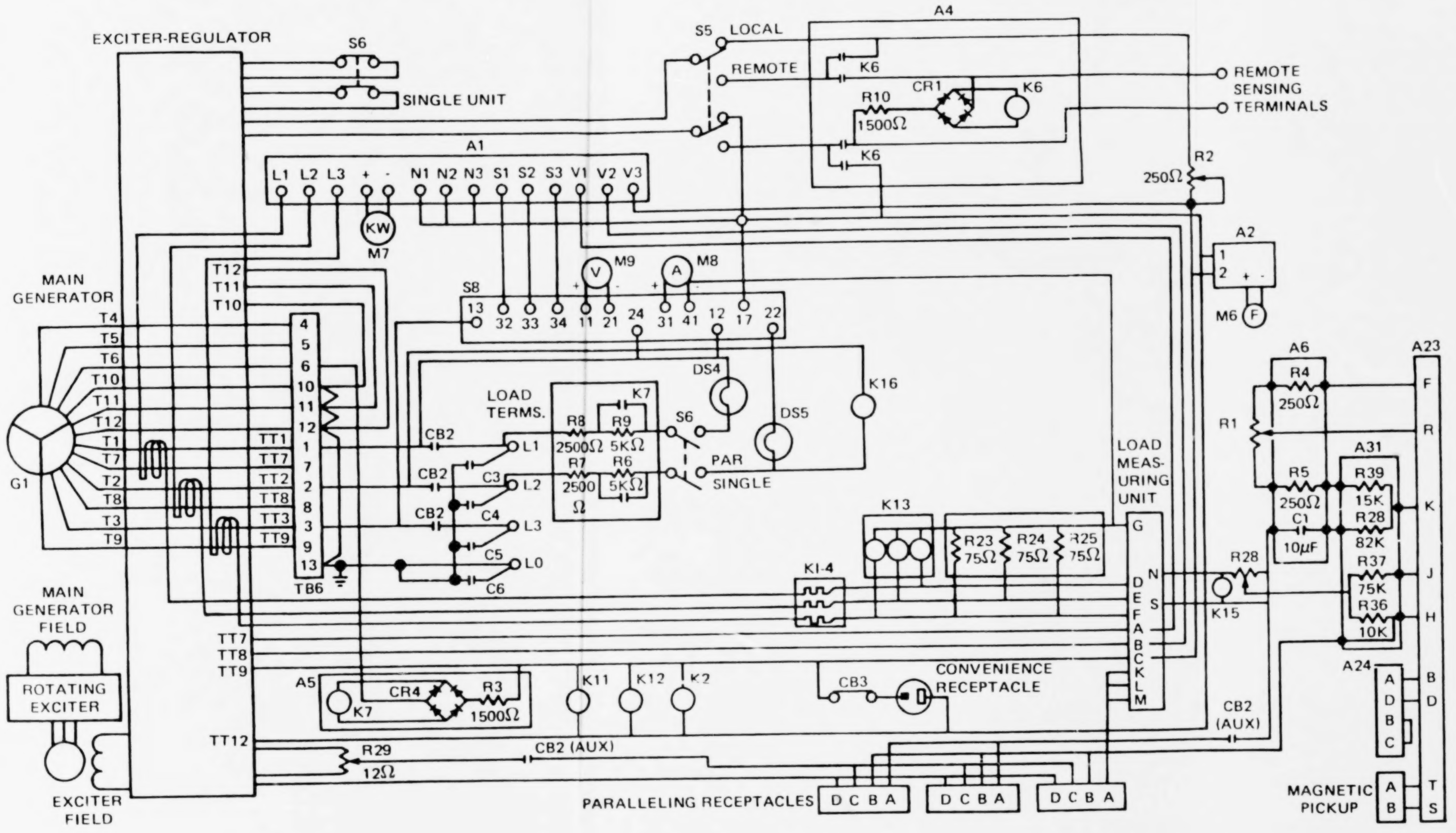
EXCITER-REGULATOR
S6
SINGLE UNIT
S5
LOCAL
REMOTE
A4
K6
R10
1500Ω
CR1
K6
K6
REMOTE
SENSING
TERMINALS
R2
250Ω
A1
L1 L2 L3 + - N1 N2 N3 S1 S2 S3 V1 V2 V3
KW
M7
A2
1 2 + -
M6
F
MAIN
GENERATOR
T12
T11
T10
S8
13 32 33 34 11 21 24 31 41 12 17 22
V
M9
A
M8
DS4
DS5
K16
T4
T5
T6
T10
T11
T12
T1
T7
T2
T8
T3
T9
G1
TB6
4 5 6 10 11 12 1 7 2 8 3 9 13
TT1
TT7
TT2
TT8
TT3
TT9
CB2
C3
C4
C5
C6
LOAD
TERMS.
L1
L2
L3
L0
R8
2500Ω
R9
5KΩ
R7
2500
Ω
R6
5KΩ
K7
S6
PAR
SINGLE
K13
R23
75Ω
R24
75Ω
R25
75Ω
K1-4
LOAD
MEAS-
URING
UNIT
G
N
D
E
F
A
B
C
K
L
M
S
R28
K15
A6
R4
250Ω
R1
R5
250Ω
C1
10μF
A31
R39
15K
R38
82K
R37
75K
R36
10K
A23
F
R
K
J
H
B
D
T
S
A24
A
D
B
C
MAGNETIC
PICKUP
A
B
MAIN
GENERATOR
FIELD
ROTATING
EXCITER
EXCITER
FIELD
TT7
TT8
TT9
TT12
A5
K7
CR4
R3
1500Ω
K11
K12
K2
CB3
CONVENIENCE
RECEPTACLE
CB2
(AUX)
R29
12Ω
CB2 (AUX)
PARALLELING RECEPTACLES
D C B A
D C B A
D C B A

TB6		
TERMINALS CONNECTED TOGETHER		
120/208 VOLT CONNECTION		240/416 VOLT CONNECTION
1 - 7	4 - 10	4 - 7
2 - 8	5 - 11	5 - 8
3 - 9	6 - 12	6 - 9

A1	CONVERTER, WATT
A2	CONVERTER, FREQUENCY
A4	CONTROL PANEL RELAY ASSEMBLY
A5	DC RELAY ASSEMBLY
A6	RESISTOR ASSEMBLY GOVERNOR
A7	RESISTOR ASSEMBLY, CT LOAD, R23, 24, 25
A23	GOVERNOR CONTROL UNIT
A24	GOVERNOR ACTUATOR
A31	LOAD SHARING
C1	CAPACITOR
CB2	CONTACTOR, AC
CB3	CIRCUIT BREAKER, CONVENIENCE RECEPTACLE
CR1	DIODE, FULL WAVE BRIDGE
CR4	DIODE, FULL WAVE BRIDGE
DS5	LIGHT, SYCHRONIZING
DS5	LIGHT, SYCHRONIZING
G1	GENERATOR
K2	RELAY, OVER VOLTAGE
K6	RELAY, REMOTE VOLTAGE SENSING
K7	RELAY, PAR LIGHTS VOLTAGE SENSOR
K11	RELAY, UNDER VOLTAGE
K12	RELAY, UNDER FREQUENCY
K13	RELAY, SHORT CIRCUIT
K14	RELAY, OVERLOAD
K15	RELAY, REVERSE POWER
K16	RELAY, PERMISSIVE PARALLELING
M6	METER, FREQUENCY
M7	METER, KILOWATT
M8	AMMETER, AC
M9	VOLTMETER
R1	RHEOSTAT, FREQUENCY ADJUSTING
R2	RHEOSTAT, VOLTAGE ADJUSTING
R3	RESISTOR
R4	RESISTOR
R5	RESISTOR
R6	RESISTOR
R7	RESISTOR
R8	RESISTOR
R9	RESISTOR
R10	RESISTOR
R28	RHEOSTAT, LOAD SHARING
R29	RHEOSTAT, REACTIVE CURRENT
R36-R39	RESISTOR, LOAD SHARING
S5	SWITCH, UNIT PARALLEL
S8	SWITCH, AMMETER-VOLTAGE TRANSFER
TB6	TERMINAL BOARD, RECONNECTION
C3	CAPACITOR, EMI SUPRESSION
C4	CAPACITOR, EMI SUPRESSION
C5	CAPACITOR, EMI SUPRESSION
C6	CAPACITOR, EMI SUPRESSION

FO-2. AC Schematic Diagram, 15 and 30 KW,
Precise Generator Sets, Dwg. No. 84-805

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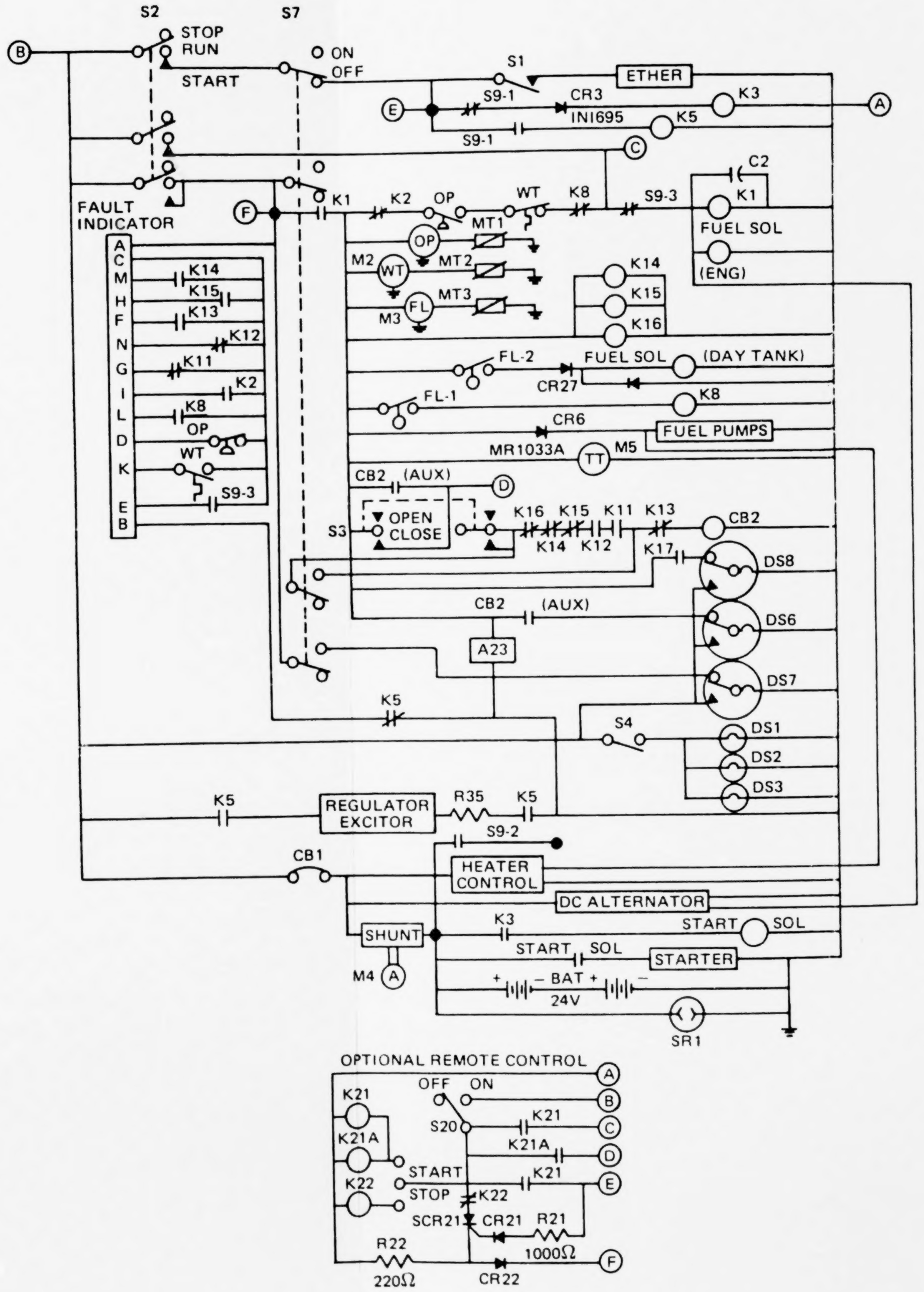
S2
S7
STOP
RUN
START
ON
OFF
S1
ETHER
S9-1
CR3
IN1695
K3
K5
FAULT INDICATOR
A C M H F N G I L D K E B
K14
K15
K13
K12
K11
K2
K8
OP
WT
S9-3
K1
C2
FUEL SOL
(ENG)
MT1
MT2
MT3
M2
M3
FL-2
FL-1
CR27
(DAY TANK)
CR6
FUEL PUMPS
MR1033A
M5
TT
K16
CB2
(AUX)
S3
OPEN
CLOSE
K17
DS8
DS6
DS7
A23
S4
DS1
DS2
DS3
REGULATOR EXCITOR
R35
S9-2
CB1
HEATER CONTROL
DC ALTERNATOR
START
SOL
SHUNT
M4
STARTER
BAT
24V
SR1
OPTIONAL REMOTE CONTROL
K21
K21A
K22
S20
STOP
SCR21
CR21
R21
1000Ω
R22
220Ω
CR22

A23	GOVERNOR CONTROL UNIT	
C2	CAPACITOR	
CB1	CIRCUIT BREAKER, DC	
CB2	CONTACTOR, AC	
CR3	DIODE	
CR6	DIODE	
CR21	DIODE	
CR22	DIODE	
CR27	RECTIFIER ASSEMBLY	
DS1	LIGHT, PANEL	
DS2	LIGHT, PANEL	
DS3	LIGHT, PANEL	
DS6	LIGHT, INDICATOR, CIRCUIT BREAKER	
DS7	LIGHT, PROTECTION BYPASS	
DS8	LIGHT, INDICATOR, AIR CLEANER	
K1	RELAY, STOP - RUN	
K2	RELAY, OVER VOLTAGE	
K3	RELAY, CRANK	
K5	RELAY, FIELD FLASH	
K8	RELAY, FUEL LEVEL	
K11	RELAY, UNDERVOLTAGE	
K12	RELAY, UNDER FREQUENCY	
K13	RELAY, SHORT CIRCUIT	
K14	RELAY, OVERLOAD	
K15	RELAY, REVERSE POWER	
K16	RELAY, PERMISSIVE PARALLELING	
K17	SWITCH, AIR CLEANER RESTRICTION	
K21	RELAY, REMOTE START	
K22	RELAY, REMOTE STOP	
M1	METER, OIL PRESSURE	
M2	METER, COOLANT TEMPERATURE	
M3	METER, FUEL LEVEL	
M4	AMMETER, BATTERY CHARGING	
M5	METER, TOTAL TIME	
MT1	TRANSDUCER, OIL PRESSURE	
MT2	TRANSDUCER, COOLANT TEMPERATURE	
MT3	TRANSDUCER, FUEL LEVEL	
R21	RESISTOR	
R22	RESISTOR	
R35	RESISTOR, FIELD FLASH	
FL-1	SWITCH, FUEL LEVEL	
FL-2	SWITCH, FUEL LEVEL	
OP	SWITCH, OIL PRESSURE	
WT	SWITCH, COOLANT TEMPERATURE	
S1	SWITCH, ENGINE PRIMER	
S2	SWITCH, START - RUN - STOP	
S3	SWITCH, CONTACTOR	
S4	SWITCH, PANEL LIGHTS	
S7	SWITCH, BATTLE SHORT	
S9-1	START - DISCONNECT AND FIELD FLASH	SPEED SWITCH
S9-2	NOT USED	
S9-3	OVERSPEED	
S20	SWITCH, REMOTE ON - OFF	
SCR21	SILICON CONTROL RECTIFIER	
SR1	RECEPTACLE, SLAVE	

FO-3. DC Schematic Diagram, 15 and 30 KW, Precise Generator Sets, Dwg. No. 84-804

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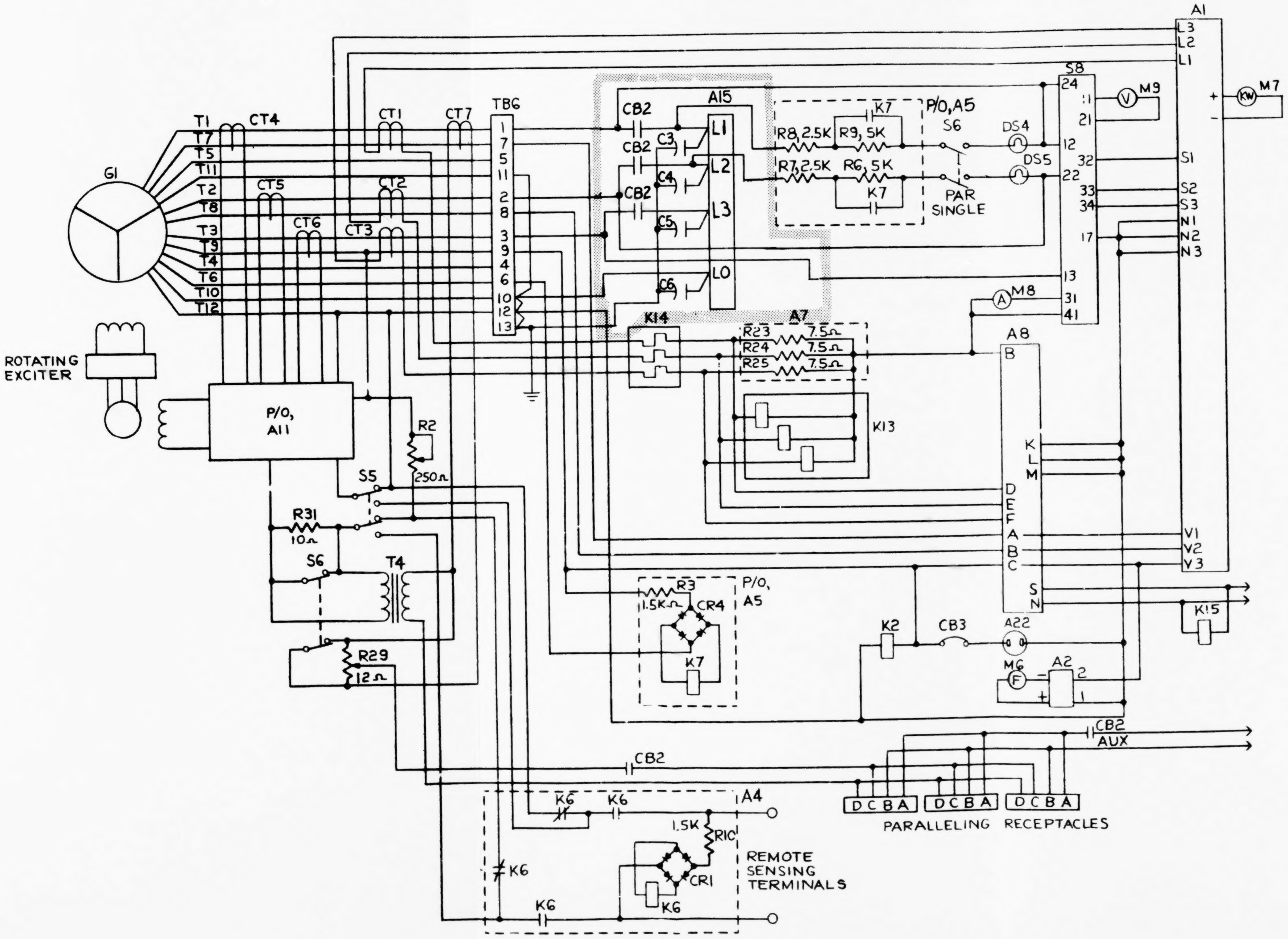
A1
L3
L2
L1
G1
T1
T7
T5
T11
T2
T8
T3
T9
T4
T6
T10
T12
CT4
CT1
CT7
TB6
CT5
CT2
CT6
CT3
1
7
5
11
2
8
3
9
4
6
10
12
13
CB2
A15
C3
CB2
C4
CB2
C5
C6
L1
L2
L3
L0
K7
R8 2.5K
R9 5K
R7 2.5K
R6 5K
K7
P/O, A5
S6
PAR
SINGLE
DS4
DS5
S8
24
11
21
12
32
22
33
34
17
13
31
41
V
M9
KW
M7
S1
S2
S3
N1
N2
N3
A
M8
K14
A7
R23 7.5Ω
R24 7.5Ω
R25 7.5Ω
K13
A8
B
K
L
M
D
E
F
A
B
C
S
N
V1
V2
V3
ROTATING EXCITER
P/O, A11
R2
250Ω
S5
R31
10Ω
S6
T4
R29
12Ω
R3
1.5KΩ
CR4
P/O, A5
K7
K2
CB3
A22
K15
M6
F
A2
2
1
CB2
CB2
AUX
D C B A
D C B A
D C B A
PARALLELING RECEPTACLES
K6
K6
A4
1.5K
R10
K6
CR1
K6
K6
REMOTE SENSING TERMINALS

ASSEMBLIES

A1	CONVERTOR, THERMAL WATT
A2	CONVERTOR, FREQUENCY
A4	CONTROL PANEL RELAY ASSY
A5	DC RELAY ASSY
A7	RESISTOR ASSY, CURRENT TRANSFORMER LOAD
A8	GOVERNOR LMU
A11	STATIC EXCITER
A15	LOAD TERMINALS
A22	CONVENIENCE RECEPTACLE BOX

CIRCUIT BREAKERS

CB2	CONTACTOR, MAIN AC OUTPUT
CB3	CONVENIENCE RECEPTACLE

DIODES

CR1	FULL WAVE BRIDGE, REMOTE SENSING CIRCUIT
CR4	FULL WAVE BRIDGE, K7 CIRCUIT

TRANSFORMERS

CT1	INSTRUMENTS
CT2	INSTRUMENTS
CT3	INSTRUMENTS
CT4	EXCITER
CT5	EXCITER
CT6	EXCITER
CT7	CROSS CURRENT

LIGHTS

DS4	SYNCHRONIZING
DS5	SYNCHRONIZING
G1	MAIN ALTERNATOR

RELAYS

K2	OVERVOLTAGE
K6	REMOTE VOLTAGE SENSING
K7	PARALLEL LIGHTS VOLTAGE SENSOR
K13	SHORT CIRCUIT
K14	OVERLOAD
K15	REVERSE POWER

METERS

M6	FREQUENCY
M7	KILOWATT
M8	AMMETER
M9	VOLTMETER

RESISTORS

R2	RHEOSTAT, VOLTAGE ADJUST
R3	DROPPING FOR CR4-(K7)
R6	PARALLELING LIGHT
R7	PARALLELING LIGHT
R8	PARALLELING LIGHT
R9	PARALLELING LIGHT
R10	DROPPING FOR CR1 (K6)
R23	GOVERNOR
R24	GOVERNOR
R25	GOVERNOR
R29	RHEOSTAT, REACTIVE CURRENT SHARING
R31	RHEOSTAT, RATE ADJUST, VOLTAGE REGULATOR

SWITCHES

S5	LOCAL-REMOTE VOLTAGE
S6	UNIT-PARALLEL
S8	VOLT-AMP SELECTOR
TB6	RECONNECTION BOARD
T4	TRANSFORMER

NOTES:

1. INTERPRET DRAWING PER MIL-STD-100.

TB6		
TERMINALS CONNECTED TOGETHER		
120/208 VOLT CONNECTION		240/416 VOLT CONNECTION
1-7	4-10	4-7
2-8	5-11	5-8
3-9	6-12	6-9

ME 5-6115-465-12/FO-1(4)

FO-4. AC Schematic Diagram, 15 and 30 KW, Utility Generator Sets, Dwg. No. 72-2295

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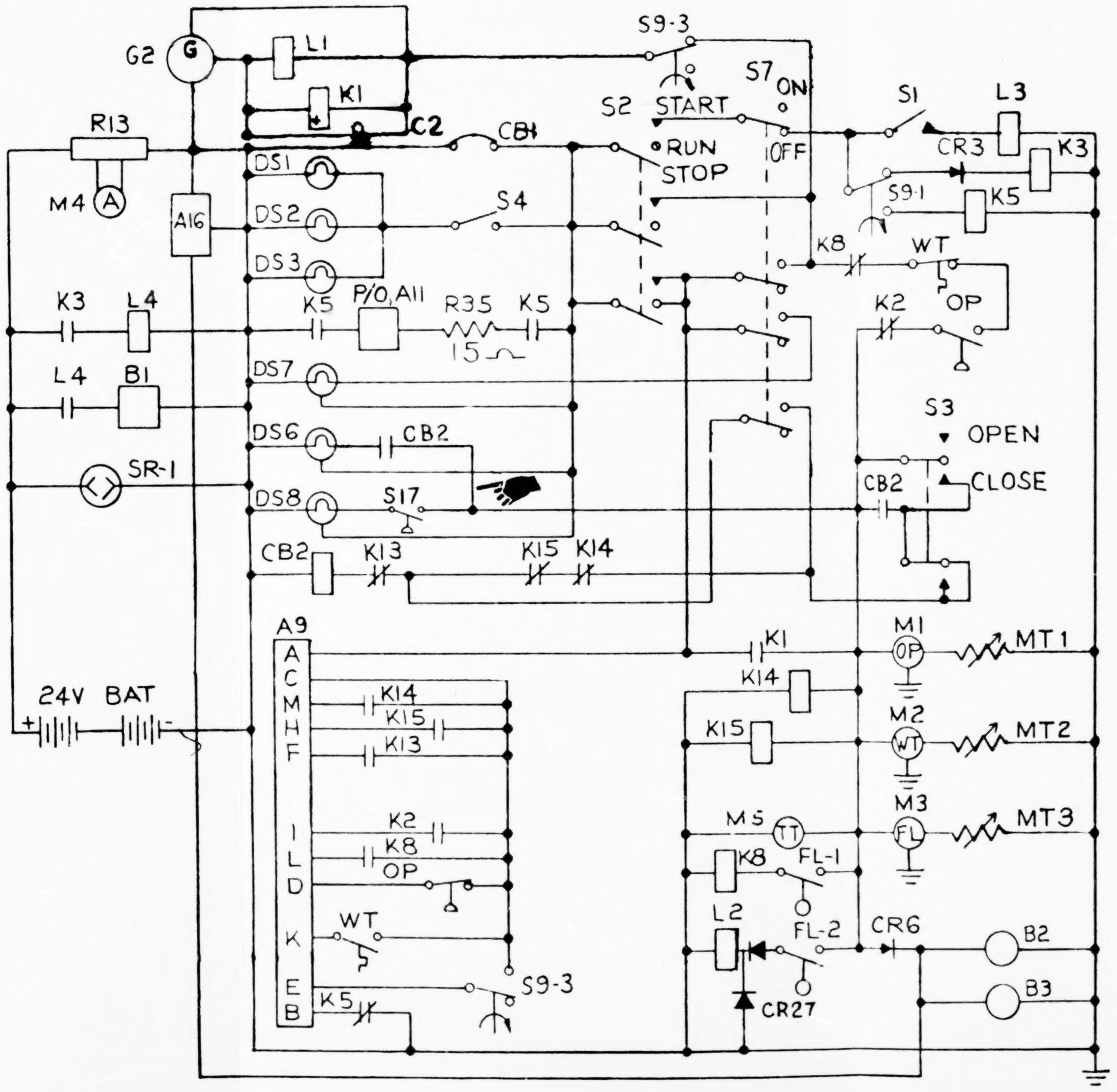
S9-3
G2
G
L1
K1
C2
CB1
R13
M4
A
A16
DS1
DS2
DS3
S4
K3
L4
K5
P/O A11
R35
15
K5
L4
B1
DS7
DS6
CB2
SR-1
DS8
S17
CB2
K13
K15
K14
A9
A
C
M
H
F
I
L
D
K
E
B
K14
K15
K13
K2
K8
OP
WT
S9-3
K5
24V BAT
+
S7
ON
OFF
S2
START
RUN
STOP
S1
L3
CR3
K3
S9-1
K5
K8
WT
K2
OP
S3
OPEN
CLOSE
CB2
K1
M1
OP
MT1
K14
K15
M2
WT
MT2
M5
TT
M3
FL
MT3
K8
FL-1
L2
FL-2
CR6
CR27
B2
B3

ASSEMBLIES

A9	FAULT INDICATOR SYSTEM
A11	STATIC EXCITER
A16	HEATER CONTROL BOX
B1	STARTER MOTOR
B2	FUEL PUMP
B3	FUEL PUMP
C2	CAPACITOR

CIRCUIT BREAKERS

CB1	D.C. CONTROL
CB2	CONTACTOR, MAIN AC OUTPUT

DIODES

CR3	START CIRCUIT
CR6	FUEL PUMPS
CR27	RECTIFIER ASSY

LIGHTS

DS1	PANEL
DS2	PANEL
DS3	PANEL
DS6	INDICATOR, CIRCUIT BREAKER (CONTACTOR)
DS7	PROTECTION BY PASS
DS8	INDICATOR, AIR CLEANER
G2	BATTERY CHARGING ALTERNATOR

RELAYS

K1	STOP-RUN
K2	OVERVOLTAGE
K3	CRANK
K5	FIELD FLASH
K8	FUEL LEVEL
K13	SHORT CIRCUIT
K14	OVERLOAD
K15	REVERSE POWER

SOLENOIDS

L1	ENGINE FUEL
L2	DAY TANK FUEL
L3	ETHER
L4	STARTER

METERS

M1	OIL PRESSURE
M2	COOLANT TEMPERATURE
M3	FUEL LEVEL
M4	BATTERY CHARGING
M5	TOTAL TIME
MT1	TRANSDUCER, OIL PRESSURE
MT2	TRANSDUCER, COOLANT TEMP
MT3	TRANSDUCER, FUEL LEVEL

RESISTORS

R13	SHUNT, INSTRUMENT
R35	FLASH FIELD CURRENT LIMITING

SWITCHES

FL1	FUEL LEVEL
FL2	FUEL LEVEL
OP	LOW OIL PRESSURE
WT	HIGH COOLANT TEMPERATURE
S1	ENGINE PRIMER
S2	START-RUN-STOP
S3	CONTACTOR
S4	PANEL LIGHTS
S7	BATTLE SHORT
S9	ENGINE SPEED
S17	SWITCH, AIR CLEANER RESTRICTION
SR1	SLAVE RECEPTACLE

NOTES:

1. INTERPRET DRAWING PER MIL-STD-100.
2. DIAGRAM APPLIES TO 15 KW AND 30 KW GENERATOR SETS MODEL NUMBERS MEP 004A AND MEP 005A RESPECTIVELY.

ME 6115-465-12/FO-5/C2
ME 6115-464-12/FO-5/C2

FO-5. DC Schematic Diagram, 15 and 30 KW, Utility Generator Sets, Dwg. No. 72-2277

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